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JANUARY 1932

35 CENTS

# AERO DIGEST



**Maintenance  
of an Airline**



**Have We Forgotten  
The World War?**

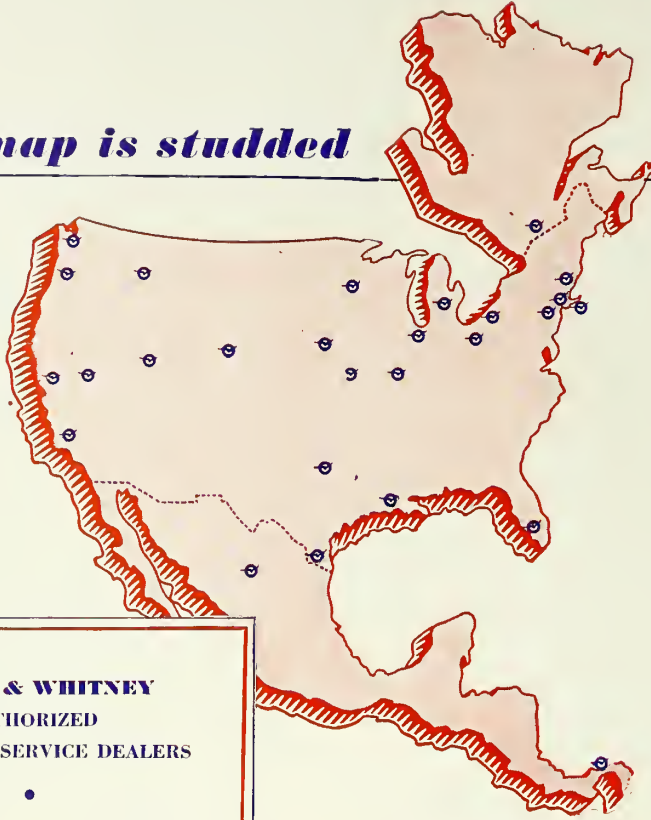
**Maj. Gen. James E. Fechet  
U. S. Army (Ret.)**



**New Methods  
and Equipment**

**Your map is studded**

**with . .**



**PRATT & WHITNEY  
AUTHORIZED  
PARTS AND SERVICE DEALERS**

- Garden City, N. Y. Air Associates, Inc.
- Dallas, Texas The Aircraft Service & Supply Co.
- Dallas, Texas American Airways, Inc.
- St. Louis, Mo. American Airways, Inc.
- Newark, N. J. American Airways, Inc.
- Farmingdale, N. Y. American Airplane & Engine Co.
- Cheyenne, Wyoming Boeing Air Transport, Inc.
- Salt Lake City, Utah Boeing Air Transport, Inc.
- Omaha, Nebraska Boeing Air Transport, Inc.
- Reno, Nevada Boeing Air Transport, Inc.
- Torreon, Mexico Corporation Aeronautics De Trans.
- Chicago, Illinois National Air Transport, Inc.
- Butte, Montana National Parks Airways, Inc.
- St. Paul, Minnesota Northwest Airways, Inc.
- Seattle, Wash. Pacific Air Transport, Inc.
- Oakland, Calif. Pacific Air Transport, Inc.
- Burbank, Calif. Pacific Airplane Corporation, Ltd.
- Miami, Florida Pan American Airways, Inc.
- Brownsville, Texas Pan American Airways, Inc.
- Cristobal, C. Z. Pan American Airways, Inc.
- Cleveland, Ohio Thompson Aeronautical Corporation
- Pontiac, Mich. Thompson Aeronautical Corporation
- Kansas City, Mo. Transcontinental & Western Air, Inc.
- Columbus, Ohio Transcontinental & Western Air, Inc.
- Hartford, Conn. United Airports of Connecticut
- Portland, Ore. Varney Air Lines
- Patterson, La. Wedell-Williams Air Service
- Montreal, Canada Canadian Pratt & Whitney Aircraft Co., Ltd.

**PRATT & WHITNEY  
SERVICE STATIONS**

*where craftsmen maintain  
the dependability that  
craftsmanship has built*

Conveniently located, twenty-eight Pratt & Whitney Authorized Parts and Service Dealers dot this continent. At each of these points complete stocks of parts are available. Every phase of service work is supervised by men trained in the Pratt & Whitney plant. Thus every Wasp and Hornet engine in North America is backed up by inspection and maintenance service as dependable as the engine itself.

**THE  
PRATT & WHITNEY AIRCRAFT CO.  
EAST HARTFORD . . . CONNECTICUT**

*Division of United Aircraft & Transport Corp.*

Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Germany by Bavarian Motor Works, Munich; and in Japan by Nakajima Aircraft Works, Tokyo.

**Wasp\* & Hornet**  
\* Registered Trade-Mark

*Engines*





# NEW YEAR SPECIALS

## At Typical ORT Prices

PLEASE USE  
THIS  
ORDER FORM

### CONSOLIDATED OIL PRESSURE GAUGE

New. Very accurate and good looking. Regular price \$3.50.  
**ORT'S PRICE**

**98¢**

### DIXIE

Double Ignition Switch, U. S. Army spec. New, fool-proof — finest grade — as illustrated. Regular price \$3.50.



**ORT'S PRICE**

**97¢**

## WHEELS TIRES AND TUBES

THESE wheels are all new and in perfect condition. They're cheap because I bought them by the hundreds. I'm selling them cheap because I want to get rid of them in a hurry. Tires, tubes and wheels may be purchased individually or at special combination prices. I am willing to wager that you can't equal these prices anywhere.

**COMBINATION NO. 1**  
26x4 clincher type new production Navy spec. wheel, brand new. Equipped with new Firestone clincher Tire and Tube. Regular price, complete \$30.35 each.

**ORT'S PRICE COMPLETE**  
**\$5.95**  
or **\$11.50 pr.**

**COMBINATION NO. 2**  
28x4 s.s. new production Navy spec. wheel, equipped with new Goodyear Tire and Tube. Regular price, complete \$32.50 each.

**ORT'S PRICE COMPLETE**  
**\$5.95**  
or **\$11.50 pr.**

**COMBINATION NO. 3**  
24x4 s.s. Kelsey-Hayes wheel, brand new. Equipped with lubricator and new 24"x4" Goodyear Tire and Tube. Regular price complete \$53.70 each.

**ORT'S PRICE COMPLETE**  
**\$9.95**  
or **\$19.35 pr.**

**COMBINATION NO. 4**  
750x125 mm. new production Navy spec. clincher type wheel, with new Goodyear Tire and Tube. Regular price complete \$37.10 each.

**ORT'S PRICE COMPLETE**  
**11.65**  
or **\$22.50 pr.**

**COMBINATION NO. 5**  
24x4 Kelsey-Hayes s.s. wheel, and lubricator, with new over-size Goodyear 25x5 Tire and Tube. Replaces regular 26x4 clinchers. Regular price complete \$41.50 each.

**ORT'S PRICE COMPLETE**  
**12.45**  
or **\$23.85 pr.**

**COMBINATION NO. 6**  
30x5 s.s. new production Navy spec. wheel. Equipped with new 30x5 Goodyear Tire and Tube. Regular price complete \$56.20 each.

**ORT'S PRICE COMPLETE**  
**12.50**  
or **\$23.50 pr.**

DEAR ORT: These are the kind of prices a fellow likes to see. Man alive, how do you do it? I have checked off below the items I want, with quantities and prices.

### WHEEL COMBINATIONS

- Combination #1...at \$ 5.95 ea. Total \$.....
- Combination #2...at \$ 5.95 ea. Total \$.....
- Combination #3...at \$ 9.95 ea. Total \$.....
- Combination #4...at \$11.65 ea. Total \$.....
- Combination #5...at \$12.45 ea. Total \$.....
- Combination #6...at \$12.50 ea. Total \$.....

### TURNBUCKLES

- ..#1 at 10c. ea. Total \$.....
- ..#2 at 12½c. ea. Total \$.....
- ..#3 at 12½c. ea. Total \$.....
- ..#4 at 15c. ea. Total \$.....

CONSOLIDATED Oil Gauges at 98c. ea. Total \$.....

DIXIE Double Ignition Switches at 97c. ea. Total \$.....

RUSCO Safety Belts: .....at \$1.95 ea. Total \$.....

Send your complete catalog which costs 10c.

Send list of Tire prices with FREE Tube offer.

Send list of other wheel bargains not advertised here.

Send list of aircraft tubing and sizes.

Enclosed is my  check  money order for \$.....covering the above items. (For catalog only, enclose dime or 10 cents in stamps.)

### ADDRESS ORDER TO

**Karl Ort**  
628 WEST POPLAR ST.  
YORK, PENN.

NAME .....

ST. ....

CITY .....

STATE .....



### TURN-BUCKLES

- No. 1—4" long 10¢ ea.
- No. 2—5" long 12½¢ ea.
- No. 3—5¾" long 12½¢ ea.
- No. 4—7" long 15¢ ea.

Guaranteed to be best quality.

### RUSCO Safety Belt, AE-19



Army and Navy type. This belt makes use of leather adjusting straps 1 inch in width, instead of being completely constructed of webbing. Five inches wide. Quick release buckle made of ¾ inch steel, forged, heat-treated and cadmium plated. Regular price \$6.50.

A. N. Spec.

**ORT'S PRICE**  
**\$1.95**

### FREE TUBES

A brand new Goodyear or Firestone Tube FREE with every tire you buy from me. I have cut the list prices of all my tires in half. Write for list of prices and save yourself some real money.

### OTHER WHEEL BARGAINS

Space does not permit my listing all the wheel bargains I have. Tell me what you need and let me show you the kind of prices you haven't seen for years. Have Bendix, Sauzedde, etc., cheap. Use the order form at the right.

### SEND A DIME FOR COMPLETE CATALOG


Remember! Your money refunded if you are not more than satisfied.

### FREE!

Every purchase exceeding \$10 will receive free of charge one of Capt. LaRoe's complete Glider Flying Courses. 5 books! Regular price, \$2.98 per set.

### NOTE:

Special prices on tubing: 1020 and 1025 seamless carbon steel tubing as low as 5¢ per foot. Chrome moly at proportionate prices. Streamlined tubing 12¢ per foot and up. Write for list of sizes.



MORE THAN

**500**

LIVES SAVED

by IRVIN Air Chutes — a far greater number than saved by all other makes of parachutes in the world combined



IRVING AIR CHUTE CO., Inc.  
372 Pearl St., Buffalo, N. Y.

West Coast Factory and Office: 1500 Flower Street, Glendale, Calif. Canadian Factory: Bridgeburg, Ont.



PITCAIRN AUTOGIRO BUILT BY PITCAIRN AIRCRAFT, INC., WILLOW GROVE, PA.

1931~

*A milestone in Autogiro ascendancy*

**T**HERE can be no doubt that the Autogiro is destined to occupy a position of major importance among aircraft of the future.

When that destiny has been fulfilled, the year 1931 will be recognized as a great milestone in Autogiro progress. This progress falls into four major classifications: Engineering development; a convincing amount of nation-wide Autogiro flight; public and scientific recognition; actual commercial Autogiro production and use.

Several transcontinental trips and hundreds of thousands of miles of routine travel by many owners have caused Autogiro flight to be accepted as almost commonplace.

Recognition by the public has been expressed in the newspapers and periodicals of the country to an almost unprecedented extent. Recognition by many official and scientific organizations is typified by the presentation

of the Collier Award "for the greatest achievement in Aviation in America, the value of which has been demonstrated by actual use during the preceding year."

The highest form of government license for unrestricted manufacture of four types of Autogiros (Approved Type Certificates) was issued by the United States Department of Commerce.

Three different licensees are now providing Autogiros for the growing market:—

- Buhl Aircraft Company, Detroit, Mich.
- Kellett Aircraft Corp., Philadelphia, Pa.
- Pitcairn Aircraft, Inc., Willow Grove, Pa.

The year 1931, marking the fruition of years of courageous and foresighted planning, serves, too, as a prophecy and promise for the future.

AUTOGIRO COMPANY OF AMERICA ~ ~ ~ LAND TITLE BUILDING ~ ~ ~ PHILADELPHIA

The Autogiro Company of America is an engineering and licensing organization. It owns and controls, exclusively, all Autogiro patent rights in the United States. Manufacturing companies of high standing will be licensed to build Autogiros with the full cooperation of our engineering staff.



# J-5 LOCKHEED VEGA, \$4980



## Completely REBUILT and Refinished



### Parks' Shop Is a Certified Government Repair Depot

—one of 12 in the whole United States. That's the best thing we can say about the quality of work done here. Department heads are among the most competent in the industry. Inspection and supervision is by Dept. of Commerce licensees.

Ask for our estimates on any overhaul or repair job for your ship or engine. Winter rates save you a surprising amount. Just write for a chart on which to indicate work to be done. We'll send it with full information.

*\$4980 Cannot Buy So Much Performance, Stamina, Comfort and Appearance in Any Other Airplane!*

Here is a remarkable offer—one that will be quickly seized by some airline operator, manufacturer, publisher or private flyer. This 5-place Lockheed Vega with Wright J-5 engine has just come out of our shop, gleaming like new and *performing* like new. She has had a complete overhaul, with every part taken down and inspected. Any wooden part that showed wear or weathering has been replaced. The fuselage has been sanded and covered with linen. The wing has been refinished. Her paint is new—a Berry red and Diana cream.

The J-5 Whirlwind got a complete overhaul, with cylinders rebored and new pistons fitted. A Townend ring has been added for increased speed. Other features are Goodrich wheels—complete instrument equipment—and a brand new license. In all respects this Lockheed is the best buy in her class in the U. S. today! You can see her—fly her—and judge for yourself. Wire or 'phone at our expense for a demonstration. Act quickly—she may be sold in a week.

**Price, flyaway Parks Airport, \$4980**

*Address Aircraft Sales Division,*

## PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

PARKS AIRPORT

EAST ST. LOUIS, ILL.

42 Complete Overhauls have been turned out of this shop in the last 11 months—and every job was right!

# IF YOU'VE GOT A SON *and if he's interested in* AVIATION *as a business—*



then here are a few things you ought to know. Aviation is no longer a sport. It has grown into a highly technical profession, wherein success depends on training and character just as it does in any other career.

Aviation has this advantage . . . it is still so new that seniority doesn't bar ability and initiative from quick promotion. With those qualities your son can go farther, faster, in aviation than in most other businesses. Without them, he had better try something else.

Character! That's *everything* in any profession. So well do we realize it that here at PARKS we work harder to build character than to teach flying . . . and the results pay, as records of our graduates prove in ample measure.

## PARKS AIR COLLEGE *makes* *your son* A MAN—

or it doesn't graduate him! In its history, this school has dismissed 271 students who lacked the character which the world demands of a man. And it has graduated 1151 of the finest young fellows you could hope to see.

Competent judges have declared Parks graduates to be the best material . . . as flyers, as technicians, and as *men* . . . coming into Aviation today. Many of them have already risen to positions of importance and responsibility.

Your son has probably mentioned PARKS AIR COLLEGE to you. In fairness to him and to your hope and pride in his future, you ought to investigate this school. If possible you should visit and inspect it, as many parents do. We welcome such visits, just as we welcome a chance to help your boy become the man that he plans . . . and you want him to be.

*You are invited to visit and inspect* **PARKS AIR COLLEGE**

### **PARKS AIR COLLEGE**

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Section I-AD

East St. Louis, Illinois



If you cannot come to the school, this book will tell you much about PARKS standards and methods. It describes all our courses in detail, with many illustrations. Sent on request.

Send me "Skyward Ho!", with information about the course checked, for a young man of \_\_\_\_\_ Age \_\_\_\_\_

- Executive Transport Pilots' Course (2 years)
- Limited Commercial Pilots' Course (3 months)
- Airplane & Engine Master Mechanics' Flight Course (1 year)
- Airplane & Engine Mechanics' Course (30 weeks)

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

**MAIL THIS COUPON**

# The Facilities and Services

**T**HE Airway Map of the United States indicates the scope of Curtiss-Wright service. Wherever you fly—as the pilot of your own plane or as a passenger on one of the scheduled air lines—the facilities of this nation-wide organization are constantly at your command.

**MANUFACTURING:**—Curtiss-Wright manufacturing divisions cover more than 1,700,000 square feet of floor space. Curtiss Aeroplane & Motor Company, Inc., Buffalo, N. Y., and Keystone Aircraft Corporation, Bristol, Pa., design and build advanced types of military aircraft for the Army and Navy—observation, pursuit, attack, bombardment planes, flying boats—and huge 18-passenger commercial transports.

The Curtiss-Wright Airplane Company, Robertson, Mo., builds training and sport planes, amphibians and fast commercial types, ranging up to 8-place transports. During 1931 Curtiss-Wright sold 36% of the total number

invested by Curtiss-Wright in a nationwide chain of Airports and Flying Service Bases—situated close to the leading centers of population, industry and finance. They are equipped with administration buildings, restaurants, classrooms, repair shops and modern, heated hangars, having a total airplane storage space of 1,150,000 square feet, providing complete facilities for many of the nation's leading air lines, including Eastern Air Transport, Inc., Transcontinental & Western Air, Inc., National Air Transport, Inc., Century Air Lines, Inc., and Pennsylvania Airlines, Inc.

**SERVICE:**—Approximately 90% of all the aircraft in the United States are within easy flying distance of Curtiss-Wright ports and authorized Wright Service Stations. Curtiss-Wright Bases are Department of Commerce approved repair stations, employing licensed aircraft and engine mechanics. Full machine shop and tool equipment are maintained. Stocks of 4,000 parts and accessories are carried. Labor and material prices are standardized.

**FLYING SCHOOLS:**—More than 5,000 competent pilots have been trained by Curtiss-Wright Flying Service. Other functions

*Curtiss-Steinberg Airport, East St. Louis*



*Curtiss-Wright Army Planes Flying Cross-Country*

of commercial planes produced by aircraft manufacturers in the United States.

Wright Aeronautical Corporation, Paterson, N. J., builds six different types of aircraft engines—including the famous Whirlwind, Cyclone and Conqueror—for the Army and Navy, airplane manufacturers and air transport operators. Wright Engines power air lines around the world.

**AIRPORTS:**—Over \$30,000,000 have been



## CURTISS · WRIGHT

# of CURTISS · WRIGHT



*Curtiss-Wright Facilities are Nation-Wide*

of this organization are: Airplane Sales and Service, Ground School Training, Aviation Mechanics and Engineering Courses, Aerial Photography, Sightseeing Flights and Charter Service—which ties up logically with the operations of scheduled transport operators.

These are the facilities of Curtiss-Wright . . . facilities which have given this organization leadership since the early pioneer days of Aviation. CURTISS-WRIGHT CORPORATION, 29 West 57th Street, New York City.



CURTISS-WRIGHT CORPORATION  
29 West 57th Street, New York City

CURTISS AEROPLANE & MOTOR  
COMPANY, INC., Buffalo, N. Y.

WRIGHT AERONAUTICAL  
CORPORATION, Paterson, N. J.

KEYSTONE AIRCRAFT  
CORPORATION, Bristol, Pa.

CURTISS-WRIGHT  
AIRPLANE COMPANY, Robertson, Mo.

CURTISS-WRIGHT  
EXPORT CORPORATION  
29 West 57th Street, New York City

CURTISS-WRIGHT FLYING SERVICE  
29 West 57th Street, New York City



*Wright Aeronautical Corporation*

# CORPORATION



Photo by R. B. Hoyt

## "Squeeze" the throttle ... *Socony Responds Instantly!*

"SQUEEZE" the throttle for the take-off . . . you need a powerful gasoline—a gasoline that gets your plane in the air quickly, without faltering.

Socony Aviation Gasoline, tested and proved under actual flying conditions in our own Socony Test Plane, and used by leading pilots when they fly in New York

and New England, insures a carefree take-off . . . gets your plane in the air fast.

When your engine is fueled with Socony Aviation Gasoline and lubricated with Socony De-waxed Motor Oil, you have a right to expect perfect engine performance, and you get it.

Try this combination next time.

# SOCONY

AVIATION GASOLINE • DE-WAXED MOTOR OIL

STANDARD OIL COMPANY OF NEW YORK, INC.





# I WISH I'D GONE TO VON HOFFMANN

"Michael Corse and I started out with the same idea—that of finding our futures in aviation.

"I thought I'd be as well off by studying locally. I thought aviation training was just aviation training, no matter where you got it. I didn't stop to compare personnel, equipment, and facilities. I "graduated" from an unapproved school and soon found that my diploma didn't mean much.

"Michael Corse's father insisted that he start with Von Hoffmann, a recognized, government-approved school. When he graduated, it meant something. He got a job a week after he graduated. That was months ago. I've been idle since. I wish I'd gone to Von Hoffmann."

Michael Corse's letter speaks for itself:

"One week after I graduated from your Limited Commercial Pilot course, I found a position at McKinley Aero-Ways of Canton, Ohio, as a pilot. It was my first application for a job and I was accepted. I feel sure that the reputation of your school had a lot to do with my success at being placed in aviation. With such capable instructors, *a student can't go wrong.*"

*Michael Corse*

Von Hoffmann is the oldest individually owned air college in the United States.

Over 98% of Von Hoffmann graduates qualify for government license on first application. Located on Lambert-St. Louis Airport, which is the only airport today holding the highest U. S. Government rating of A-Transport-A. 33 air lines radiate from this airport giving Von Hoffmann students an insight into commercial aviation.

Write for Catalog No. 459.

HIGHEST U. S. GOVERNMENT APPROVAL

Occupying over 40,000 square feet in the nerve-center of aviation



*Write for Your Copy Today!*

# VON HOFFMANN AIR COLLEGE

LAMBERT ST. LOUIS AIRPORT . . . ST. LOUIS MO.

THOROUGHbred

The Rearwin  
JUNIOR

OF THE LIGHT PLANE CLASS



AS YOU LIKE IT—  
*The Rearwin "Junior"*  
*Open or Closed . . .*

**I**N line with our policy "not to cheapen the 'Junior' in order to meet competition but to meet competition by making a better airplane"—we now offer the prospective light plane buyer a new convenience; one which makes winter flying as comfortable as summer flying. The detachable winter enclosure which we promised you several months ago and on which we have worked for the past six months, has been approved by the Department of Commerce. Not only does this detachable enclosure make the Rearwin "Junior" warm and draft-proof in the coldest weather—it also adds a new streamlined and graceful effect. The winter enclosure is available as optional equipment, at only slight additional cost.

Other interesting features of the Rearwin "Junior" are numerous. For instance—an adjustable stabilizer which can be operated from either seat. Dual controls. Large gasoline capacity for cross-country flying. Extra wide landing gear with air wheels and shock absorbers. Front and rear individual windshields (when the winter enclosure is not used). Spacious seats with plenty of leg room.

The beautiful 1932 Rearwin "Junior" is ready for delivery with the Szekely SR-3-0 45 h.p. engine or the new and more powerful Aeromarine AR-3 50 h.p. engine.

1932 will be a light plane year. Watch the "Junior"! If you are planning to buy a light plane and you want the latest—you won't be satisfied with owning anything less than a "Junior." Let us send complete data.

A. T. C. No. 434      \$1795 with 45 h.p. engine

REARWIN AIRPLANES, Incorporated

FAIRFAX AIRPORT, KANSAS CITY, KANSAS

**DEALERS:** The "Junior" is destined to dominate the light plane market this year. The *Rearwin Protected Franchise* is available to the proper individuals or organizations in certain territories. Get in touch with us right away.

**LEARN  
TO FLY**  
*in brand new  
"Juniors"*

•  
Expert  
Instructors

•  
**T**HE Rearwin Flying School offers expert flight training in brand new "Juniors" at the low rate of only \$10 an hour dual. Experienced transport pilots who are experienced also in student instruction take a personal interest in your progress. Their individual attention is part of the course.

The Rearwin "Junior," because of its slow landing speed, inherent stability, cockpit arrangement for normal-tone conversation during flight, is an ideal training plane. We have been soloing students in this plane after as little as 3½ to 4 hours of dual training.

An advantage of the Rearwin Flying School, which not many schools can offer, is the affiliation with the Rearwin manufacturing activities. In the Rearwin plant the student is able to watch aircraft construction from the blue print stage through the final test hop. Write for further details today

•  
**ONLY**  
**\$10**  
**AN HOUR**

# A MESSAGE

## FOR THE MAN who sells airplanes:

**Y**OU know that it is bad practice to fly without a parachute. The man who buys a plane from you does not—at least to the extent you do. You are protecting him and winning his good will, you are safeguarding your business and your industry when you urge him to buy a parachute at the time he buys his plane—and to wear it whenever he flies. A liberal manufacturer's discount is allowed aircraft dealers on every Switlik Safety Chute sale.

## FOR THE MAN who intends to buy an airplane:

**I**F THE dealer from whom you purchase a plane suggests that you buy, and wear, a parachute—don't assume the attitude that he is trying to high pressure you into spending more money. Look at it this way, instead—You expect to live for a good many years, yet you took out a life insurance policy. Your dealer wants you to do the same thing. A parachute is the cheapest form of life insurance for those who fly. If your dealer does not carry the Switlik line, let us send you our illustrated and descriptive catalog.



PILOT J. K. CARIS  
Forced Jump, May 12, 1931

"The accident occurred about 3:15 p.m. at the Los Angeles Municipal Airport, Inglewood, California.

"The ship had flattened out to the extent that it was impossible for me to effect its recovery. I fought the spin for 32 turns and then jumped, clearing the ship at about 1,000 feet altitude.

"I was wearing a Switlik Chute. It functioned perfectly, opening immediately after the rip cord was pulled and landing me without injury—very comfortably, in fact."

And so another pilot joined the Caterpillar Club

<b>PRICES</b>
White Silk
<b>\$300</b>
Pongee Silk
<b>\$240</b>

Western Manager—Bert White, 1223 Airway, Grand Central Air Terminal, Glendale, California

# SWITLIK

## PARACHUTE & EQUIPMENT Co.

BROAD & DYE STREETS

TRENTON, N. J.



ONE TON  
AMPHIBION  
PAYLOAD  
AT  
146 M.P.H.  
THAT'S  
PERFORMANCE



*Amphibion* **DOUGLAS**

DOUGLAS AIRCRAFT COMPANY, INC. SANTA MONICA, CALIFORNIA

# B.G.

AT 70° BELOW IN

# Alaska-

In Alaska, where American Airways, Inc., operates Alaskan Airways; where winter temperatures reach 70 degrees below zero and where oil in engines sometimes has to be heated before motors can be started, B. G.'s always function perfectly.

AT 100°  
ABOVE IN

# Texas



An American Airways Pilgrim Plane above the clouds at Waco, Texas



Joe Crosson, Chief Pilot and Arthur W. Johnson, General Manager, Alaskan Airways, Inc., with a Fairchild Plane at Fairbanks, Alaska. Temperature 70 degrees below zero

In Texas, where summer temperatures reach 100 above zero, B. G.'s function with equal perfection on the Southern Division of American Airways. In any climate—arctic or torrid—B. G.'s deliver to any engine a never-failing spark—hot, sure and steady.

American Airways, Inc.,—one of the great Ameri-

can air transportation systems—has four divisions: the Colonial; the Embry-Riddle; Universal, and Southern. Its planes fly 27,500 miles a day. It has 1233 employes including 158 pilots. It covers a large part of the United States and extends into Canada. Alaskan Airways, a subsidiary, serves a great territory in Alaska.

American Airways planes, wherever operated, use B. G. Mica Aviation Spark Plugs—regular or radio shielded

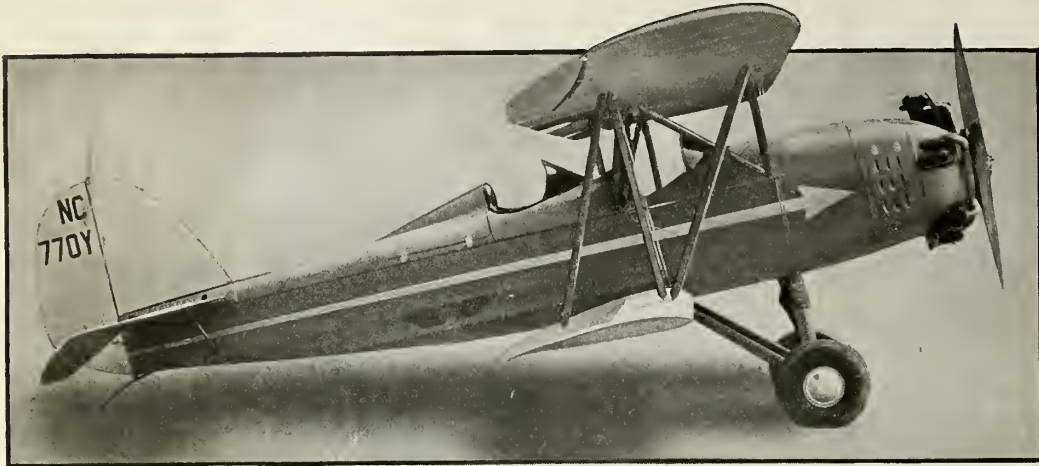
# THE B. G. CORPORATION

Contractors to the United States Army and Navy and Aircraft Engine Builders

136 West 52nd Street, New York

Cable Address: Golsteco, New York

# THE BIRD CHALLENGE FOR 1932



## BIRD Leads with a new Finance Plan

FOR THE PRIVATE OWNER - OPERATOR - DEALER

*I*N 1930 Bird challenged the aeronautic world by the production of a new, safer airplane—so safe that, in the Guggenheim Contest it won first place among all aircraft not equipped with auxiliary aids to flight. Constantly improved and refined, the Bird has met this challenge with an astonishing safety record compiled by over 200 planes in operation.

*I*n 1931 Bird again challenged—by cutting nearly one thousand dollars from the price of the improved three-place; and by introducing the Bird Four-Place, a general utility biplane with

### CURTISS-WRIGHT FLYING SERVICE COOPERATES

In addition to our present authorized dealers and representatives we wish to announce that CURTISS-WRIGHT FLYING SERVICE, INC., has selected the Bird plane as being best in its class and has been authorized to represent us on Sales and Service throughout the United States through their 30 branches and 385 dealers.

a range of uses from instruction to an outstanding performance with three passengers, all on only 125 h.p. This challenge has been more than justified by the steady volume of Bird sales in the past year of falling production.

*I*n 1932, Bird challenges again—this time to present a much-needed aid to pur-

chasers, the Bird Finance Plan, a method of buying by deferred payment without excessive charges. Bird dealers can now sell aircraft to responsible purchasers on terms which rival those of the automotive industry; in general 10 per cent down payment and balance in twelve equal monthly payments, with low interest, insurance and finance charges.

The new method benefits all concerned. It assists the private owner to buy his airplane as he would buy a car. It helps the operator, who can complete his purchase out of income.

Perhaps most of all, it will aid the responsible dealer. It opens to him new markets; permits him to use his working capital to greater advantage; and provides a powerful stimulus to Bird interest and sales. Write today for complete information.

Bird planes invite comparison in performance with any others in their power range—including planes equipped with rotor vanes, slots, flaps, or variable camber wings.

### HEYWOOD AIR STARTER

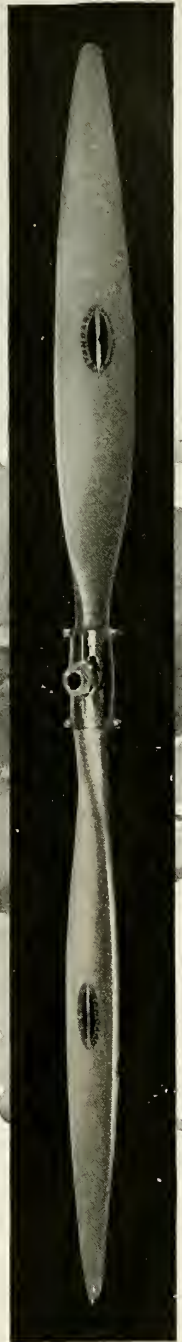
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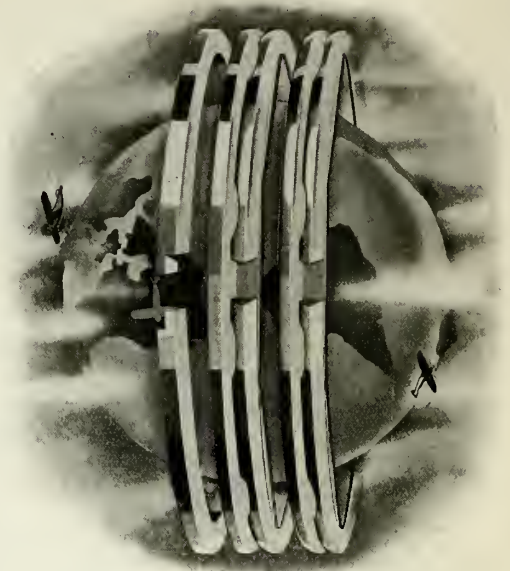


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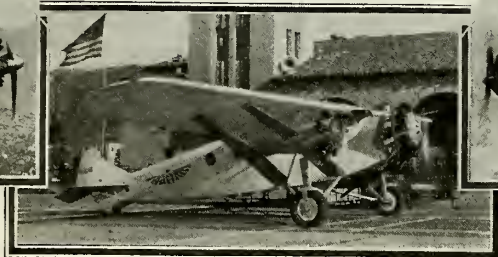
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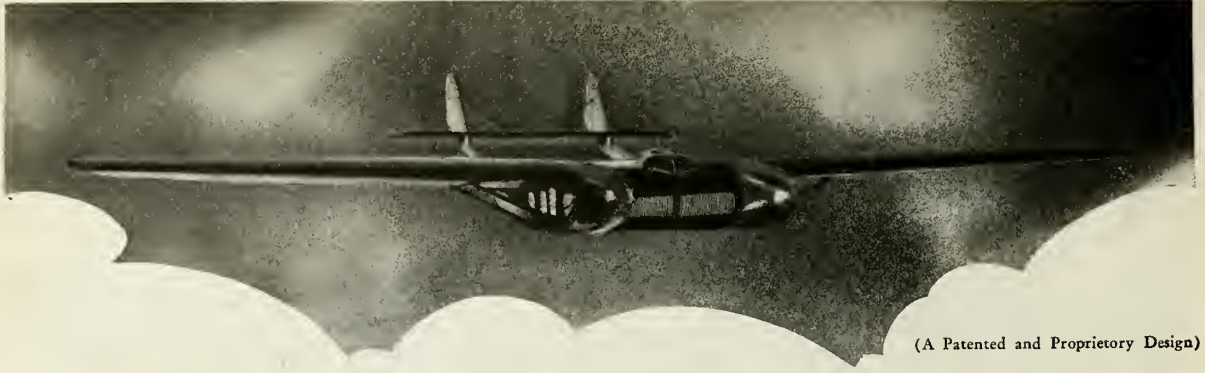
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**DOROTHY HESTER** says: "I want you to know that I used Kendall Oil in my little Cirrus Great Lakes during my daily exhibitions at the 1931 National Air Races. Kendall Oil was in the crank case when I established the Women's World Record of 62 Outside Loops and also the World's Record for either men or women of 56 Upside Down Barrel Rolls. I have used Kendall since my first primary dual training, three years ago at Mr. Rankin's School in Portland, Oregon. I am not in the least superstitious, but I would not go up for stunt exhibition without Kendall in the crank case."

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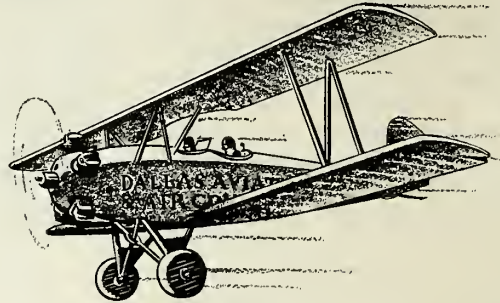
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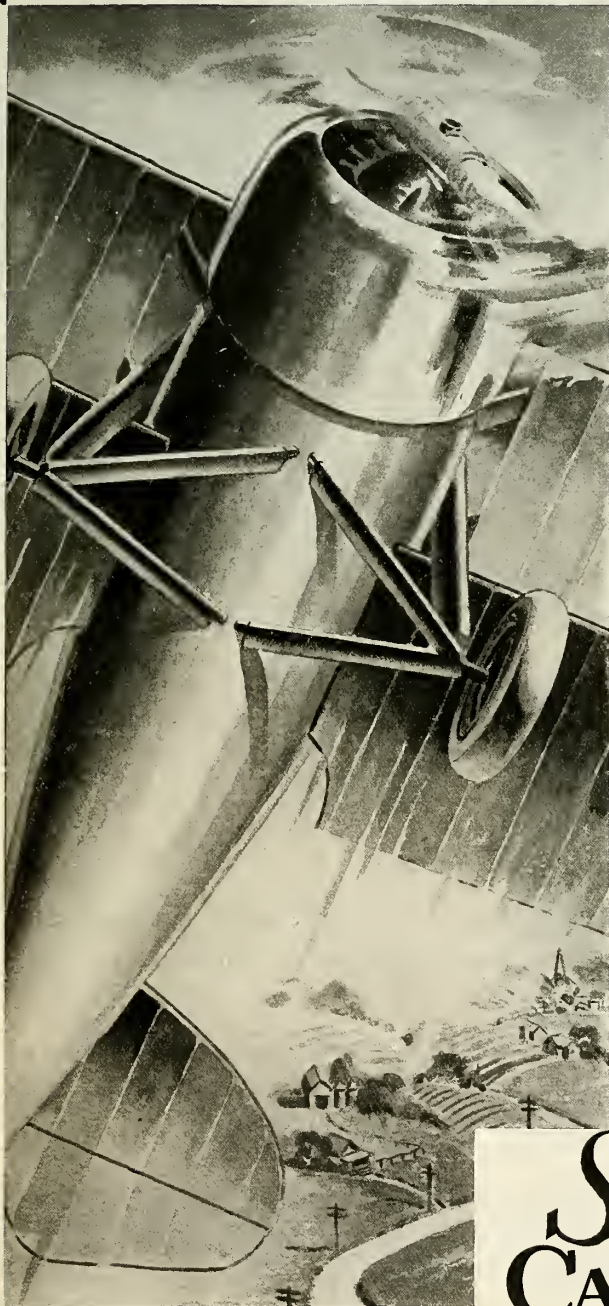
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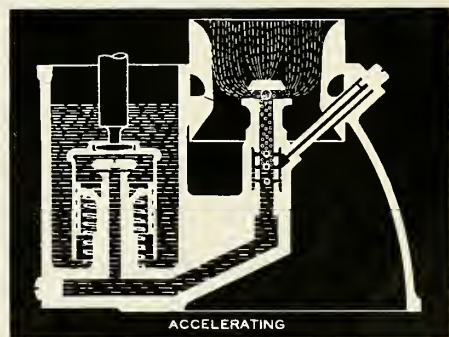


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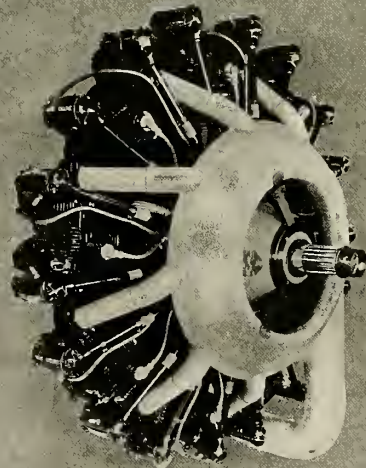
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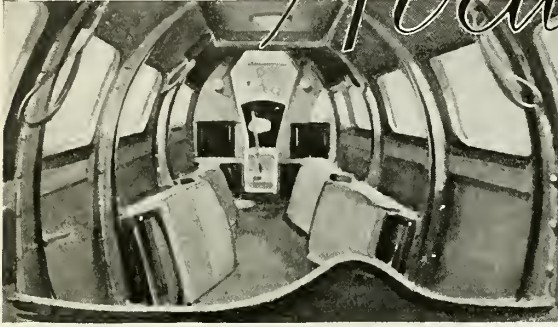


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## C O N T E N T S

### JANUARY

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*U. S. Army Air Corps Photo*

**A Group of Army Air Corps Bombers Over Washington, D. C.**

# HAVE WE FORGOTTEN THE WORLD WAR?

Major General James E. Fechet, U. S. Army, (Ret.)

**T**HERE has been very little evidence during any of the past thirteen years that the results, effects and lessons of the World War have been remembered or taken to heart in the United States.

Apparently, as a nation, we are slow to learn and profit by our mistakes. We were victorious in the war only because we had stout-hearted, better-prepared allies to hold the enemy until we could make some attempt at preparation. Even then our lack of training and equipment cost us thousands of men. We know that, yet, nationally, we do nothing about it. The United States does not show any improvement over those ancient Egyptians who thrived in years of plenty but who saved nothing and starved in years of famine. Indeed, the Chinese showed more intelligence four thousand years ago—they at least built a great wall to turn back hostile invasion. Our Saxon forefathers built high towers on the chalk cliffs of Dover the better to see the approach of the invader. They prayed daily, "Oh, Lord, from the fury of the Northmen deliver us." We neither build walls, erect towers nor pray. We are probably the most striking example which history affords in all her troubled annals, of a smug, self-satisfied, foolish people.

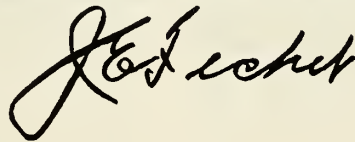
Our national attitude toward self-protection and defense is comparable to a village which, after a destructive fire, disbanded its fire department because it was needed only when there was a conflagration.

During the years immediately following the World War, our tendency toward complete disarmament was not quite so disastrous. We had nearly three million men who had just been disbanded and still possessed the rudiments of military training. These men could have been reassembled. There were large stores of munitions and supplies left over to serve us for a year until new supplies could be manufactured. Now, however, the effects of that training have largely disappeared.

Each succeeding year since 1918 our Army and Navy have grown smaller and smaller. Our protective forces have dwindled. This in spite of the valiant efforts of the American Legion to keep alive the fires of patriotism and educate us to our defenseless state.

If war should come upon us today, we would have to start fresh—raise new armies, build new equipment. Even in feverish war days, this takes time. If hostile aircraft are bombing our centers of commerce, if hostile troops

**I** HAVE come to the end of my military career and pass the control stick on to younger hands. I go in sorrow at the state of our armed forces, in sadness at the attitude of our country towards its defenders, at the false sense of security my people seem to feel. I want my last act to be this word of timely warning. We are the best hated nation in the world; we house more than our share of the world's treasure. That treasure is now practically unprotected. Unless there is immediately a national consciousness of impending trouble and ample preparation to meet it, your fools' paradise will be lost.



are pouring over our borders, we will never be allowed that period in which to get ready—do those things we should have been doing year by year.

In 1920 I heard some able public-spirited men lamenting the national apathy toward defense. At that time I made a prediction. I said, "Yes, I realize the politicians who are running this country today are heedless of our perils, for they did not fight the war—they did not even see it. They were snug and safe at home while thousands died on the battle fields. But wait. Ten years from now those men just back from France will be in the saddle. Then things will change; at least we shall have a proper, well-balanced defensive fighting force on land and

sea and in the air above us."

I was wrong. Thirteen years have elapsed since the war and we are more defenseless than we were in 1920. Apparently the men who fight wars have little influence on the processes of government.

Under our so-called National Defense Act, our armed forces are divided into two parts—our regular Army and Navy, and the semi-military component, the National Guard and Military Naval Reserve Forces.

Of course our regular Army and Navy is ridiculously small, inadequately equipped, widely scattered—and wholly insufficient to cope with any first-rate power. But that is not the saddest part. The most shameful phase of our sorry plight is the condition of that second line of defense—the citizen soldiers. Funds for keeping these Reservists trained have been reduced year by year until now it would be little worse if such funds were taken away altogether. For example, our reserve fliers will probably not be allowed more than fourteen hours of flying for the whole calendar year. Our regular fliers this year have been reduced to one hundred and twenty hours each. That is inadequate to keep the average pilot in training. Consider then the fate of those five thousand reserve fliers with only fourteen hours for the whole year! If this situation continues, we may well count them out as a fighting component of our defensive forces; they will become so stale that they would be more dangerous to themselves and their comrades than to the enemy.

In the Army we have less than a thousand first-class fighting planes. If we had twice that number it would still be inadequate to properly defend our widely extended frontiers.

(Continued on page 102)

# AIR—HOT AND OTHERWISE

Frank A. Tichenor

**W**ELL, the budget lid is off. It blew off with an explosion that was heard with deafening effect in both the Army and Navy Air Services.

The cuts made in estimates, if permitted to effect the program in accordance with the ideas of the reductionists, would seriously impair the efficiency of both services and bring to a halt the development of aircraft as an agency of America's national defense. Now we are fourth among the world powers in aircraft. Take heed lest presently we be fortieth. Unless Congress, through its committees, can be convinced that these cuts imperil our safety to an extent making it necessary to reinstate the eliminations from appropriations, the aircraft industry will be set back to the place it occupied in 1926.

It is interesting and accurate to reflect that right air development not only would tend to ward off foreign foes, thus assuring peace, but would tend against our being involved in international debt muddles.

In view of these unquestionable facts it is well to quote a few figures which may help readers to visualize just how the Air Services are losing by the budget cuts at present proposed. What they lose, of course, the industry loses, so our specialized readers will find in these figures food for particularly absorbing thought.

In 1930, \$13,936,303 was spent by the Army Air Corps on aircraft and engines. In 1931 the expenditure was \$16,778,802. The 1932 budget called for approximately \$14,462,081.

Now note the difference: the budget for 1933, representing expenditures to be appropriated by the present Congress for the fiscal year, has been cut to \$11,777,370. And bear in mind, please, that the cut thus represented concerns only planes and engines. It is rumored that from the total of appropriations for the Army Air Corps has been eliminated more than \$12,000,000 from other branches, most of which will be felt as a loss by the aircraft industry.

Heaven knows there seems to be enough to worry about. But there's no use of worrying unless intelligent action toward preventing future cause for worry springs from it. Put that well-known fact in your old pipes and smoke it, brethren of the art and business of human flight.

The 1931 gross expenditures of Admiral Moffett's Bureau of Aeronautics were \$32,033,211, with a contract authorization of \$10,000,000. For 1932 the figures are \$31,145,000, with a contract authorization of \$7,700,000. The budget for 1933 has cut the Bureau of Aeronautics down to \$26,660,000 for total expenditures for new contracts, experimental and development work and maintenance, lighter-than-air and instruments.

These reductions of Army and Navy appropriations must affect every branch of the aircraft industry, every man interested in aerial defense, all belonging to or interested in the National Guard, the Army Air Corps Reserve or the Naval Air Reserves.

Protection of the air industry against those seeking to

reduce it hopelessly or sink it will involve a difficult battle.

We have expected this. Anyone watching closely could see it in their teacups quite a little while ago. We have persistently written and on every suitable occasion talked about it.

Now we have done more than that. We have organized the AERO DIGEST Bureau in Washington and have secured the services of Major General James E. Fechet as its director. The following letter from General Fechet will make clear his conception of this important arrangement:

*My dear Mr. Tichenor:*

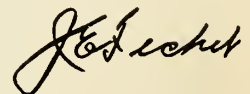
*Your offer of the directorship of AERO DIGEST's Bureau in Washington has made it necessary for me to make a drastic decision as to the remainder of my active life. Were I to remain in the Air Corps my rank and experience would insure me an important place and interesting work for the next ten years and indirectly an opportunity to help aviation in its Governmental aspects. However, serving as an officer in the Air Corps would not enable me to help the aviation industry as a whole.*

*I am not interested in the industry as a business, but it must succeed commercially if it is to be an asset of national defense. Therefore I am anxious that it should be intensively developed and kept healthy, vigorous and profitable in all its branches. Such building by Federal agencies, Army, Navy and Postal Service, must be materially encouraged by increased Federal appropriations if it is to reach quickly that point at which it will support an industry sufficient to care also for national defense needs at the beginning of a major war.*

*Your offer enables me to devote my entire time and experience to its general advancement, rather than to the interests of some particular company, as would have been the case if I had accepted any of the several offers I have received.*

*I therefore with pleasure and sincerity thank you and AERO DIGEST for and accept the opportunity you offer to help develop that most vital necessity of our American national defense—an adequate, efficient and prosperous aircraft industry.*

*Yours sincerely,*



Maj. Gen., U. S. Army (Retd.)

We will win IF the industry cooperates as heartily as General Fechet is doing by devoting his whole time and energies to the cause, thus helping not only those branches of America's aviation industry immediately linked with national defense and which obviously must be developed until none will dare attack, but those lumped usually under the general term "commercial aviation" which in the event of war would be scarcely less important. (*Cont'd on p. 100*)

# MERRY-GO-ROUND

by Caldwell

**N**EW from the Chinese-Japanese front (or more accurately speaking, the Japanese front and the Chinese rear, which are the usual opposing factions of these two armies) reminded me of my Uncle Cuthbert, of happy memory. It was Uncle Cuthbert, you may recall, who spent his declining years shooting cast-iron deer browsing on the lawns of the gay nineties. He eventually carried this harmless sport to extremes by going to Washington to take pot shots at the statues of defunct political bigbugs, at last perishing miserably under the feet of Hooker's iron horse, which he was endeavoring to hurl into the Potomac.

Uncle Cuthbert had been a philosopher for years, having refused to work after women no longer dressed in machinery; I refer to the machine age of female clothing, when they wore hoopskirts of wire and iron. Uncle Cuthbert had been a hoopskirt repairer of some standing. If a woman had hoopskirt trouble (and what woman hadn't?) off she tripped to Uncle Cuthbert's for repairs.

You may not know it, but casualties among hoopskirts were no laughing matter, especially in the spring when a young man's fancy naturally turned to thoughts of hoopskirts. The number of women in hoopskirts who had skidded off horsehair sofas in the parlor, if laid end to end and piled on top of each other, in hoopskirts, would have resembled the *Akron* in full flight. In fact, hoopskirt repairing was a trade of no mean proportions, especially in those instances in the younger and more playful set where sections of the hoopskirt had been laughingly snipped out with wire-cutters by the enraptured swain. Repairing those specimens was, as Uncle Cuthbert often said, practically a major operation, and very trying on the nerves.

It was the subway that sounded the death knell of the hoopskirt and Uncle Cuthbert's first-aid-to-hoopla emporium. Ladies who required four square yards of floor space to remain undamaged, boarded the train looking like a balloon and came out resembling a baby Austin that had tried to squeeze between two Mack trucks. The rush of modern transportation caused the ladies to discard hoopskirts—sometimes right in the subway—and thus brought to an untimely end Uncle Cuthbert's intriguing profession. He tried other lines of endeavor but couldn't seem to get his hand in, so gave up all further effort and became a philosopher.

It was in this philosophical stage

(which is the next stage to dotage) that Uncle Cuthbert arrived at his conclusions regarding warfare, of which I am reminded by the Japanese war—when they can catch up with the Chinese. Incidentally, I understand the plan is to equip the Japs with bicycles and roller skates and put four-wheel brakes on the Chinamen. This might bring them together.

What Uncle Cuthbert concluded was that war was Nature's way of reducing surplus population and that nothing could be done about it. The only trouble, he said, was that the wrong people got reduced. He had a list of politicians and big financial leaders and economic experts and other riff-raff that he'd sooner have seen reduced than the healthy youth of the warring nations. In fact, the delight of his declining years was the thought that bombing aircraft would be able to bring the war right home to the proper authorities. I've heard him say that if only he could be at a session of Congress when a large bomb dropped on it, he'd die happy.

Oddly enough, Uncle Cuthbert was the only man who correctly foretold the world war. His forecasting method was simple: He merely interviewed financial, industrial and political leaders, all of whom told him: "There will never be another war." Then he interviewed several leading divines who said, "The world is now so civilized that war is unthinkable." This made it unanimous, so Uncle Cuthbert came home and told me to expect war any day now. That was in July, 1914, and next month the war to save the world for the next war was under way with a lusty toot on the trumpet.

Being young and very bold—both of which conditions I've outgrown—I leaped into the fray myself, mainly because I hated work and liked travel. Uncle reminded me that he had fought in the Civil War—ostensibly to free the slaves—and that the main result was that the blacks were set free to starve or emigrate to Harlem, and the whites were sold to the factory and mine owners. "The results of the world war will be equally surprising and satisfactory," said Uncle Cuthbert. And as it turned out, he was right.

I wonder what the old hoopskirt manipulator and cast iron deer huntsman would say today. Our financial and economic leaders declare that the world is broke and can't afford a war, any more than it could in 1914. Everyone is also agreed that another war is unthinkable; they were agreed about the

(Continued on page 98)



Underworld Photo

Miss Halitosis Winterbottom, Grand Exalted Organizer of the "Daughters of I Will Arise," declares that she will defend Harlem against invasion

# MAINTENANCE OF AN AIRLINE

By Kenneth Foree

**T**WO years ago twenty men at Dallas, Texas, serviced the planes of American Airways, Southern Division. Today, foremanned by practically the same twenty men, 160 highly skilled craftsmen, representing forty trades, service the ships of the southern transcontinental route and keep them in proper flying condition.

The American Airways' shops at Dallas contain what is said to be the largest airplane maintenance personnel in the world. This force operates under a Department of Commerce certificate.

The safety record of the division is noteworthy—not only has there been no loss of life of passenger or pilot, but no serious injury in more than 7,000,000 miles of scheduled operations. The planes of the Southern division have traveled a distance equal to 280 times around the earth without a fatality.

Visitors invariably are impressed as they pass through the gates of the shops to observe the clean floors and the neat-looking workmen. The man at the gate, who takes their passes and makes a notation in his book, is a sample of the system and business-like methods which prevail throughout. Just inside the hangar the visitor sees the precautions taken to prevent injury to plane or engine from dust or other foreign substance.

When the ships come in they are washed and their tanks filled with gas and oil. An inspector goes over the pilots' record book and with an eye trained to detect flaws, he makes a thorough inspection and fills out a written memorandum of the work to be done. The maintenance crew then gets busy.

After every twenty-five hours in the air, each ship gets a rigid inspection that surpasses in severity the one the Department of Commerce requires at the end of a year's flying. Each mechanic initials his part of the work on forms in the plane's log book and the log is a history of the ship from the day of its purchase. Such an inspec-

tion is only skin-deep as far as actual maintenance is concerned. In another part of the shop one may see a crew of men swarming over a partly dismantled plane which has had 1,000 hours in the air, tearing it down preparatory to rebuilding it. Engines are completely rebuilt after every 250 flying hours.

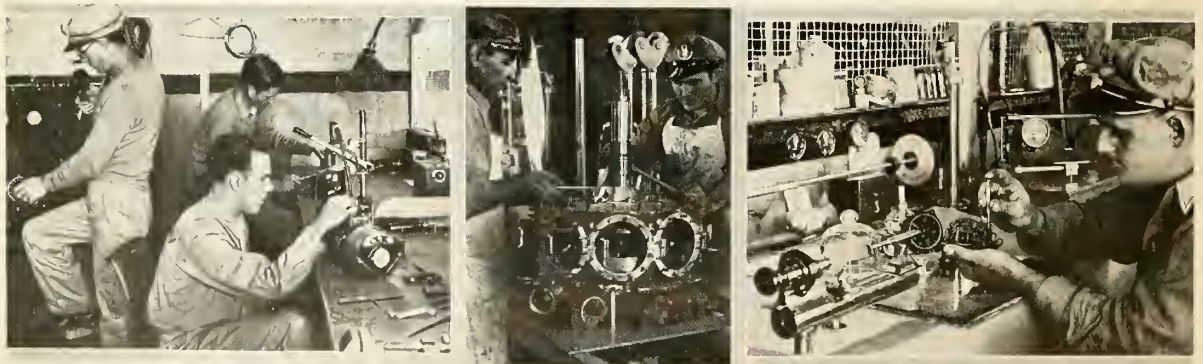
A practically new plane is turned out every three weeks and one to three engines are rebuilt every day with new parts wherever the machine is subject to mechanical fatigue. Propellers are removed and inspected after each fifty hours of flight. Batteries are taken out every night and charged. Watchmakers work constantly regulating instruments up to the necessary standard of perfection.

On a recent visit the writer saw a plane being torn down. The ship had been weighed and a careful estimate as to the cost of rebuilding made on a detailed form. After approval by the general manager, the maintenance crews had gone to work to tear the plane apart and send its components into different subsidiary departments of the overhaul plant.

On the dismantled wing, as well as the fuselage, landing gear, engines, seats, radio apparatus and flying instruments, were tags placed by inspectors specifying whether they were to be rebuilt, discarded, welded, corrected, or checked, and the nature of the needed repairs. The synchronization of trained effort of all the force convincingly demonstrated that transport aviation, as carried on in this manner, is a thorough, systematized, efficient business.

The wing, weighing a ton, was unbolted and swung off by an overhead conveyor operated by two men. By the same two it was turned upside down, the covering removed, and the interior examined by an inspector. After he decides the extent of the repairs, the wing is placed on carpenter's horses and leveled with a surveyor's instrument.

One of the wings was in the process of reconstruction. A squad of workmen had rebuilt the inside and were en-



At the Dallas shops of American Airways. (Left)—Working on radio generator and testing radio set. (Center)—Completing assembly of an engine. (Right)—Clockmaker examining instruments used on the airplane

gaged in replacing the plywood.

Next to the wing section was the fuselage department, a hundred-foot-square room. The fifty-two foot steel tube frame was being inspected. The paint had been removed and an inspector was searching with a microscope for rust pits, cracks or sprung members of the two-inch tubes of special steel alloy. If any member was found imperfect, it was removed. At the end of the frame welders were putting in new parts received from the factory. The log book of the fuselage showed about half of the original tube frame had been replaced but it is impossible to tell the original from the new.

After the general inspection and replacements are completed the tubes are filled with varnish under air pressure, which makes the inside impervious to weather conditions and discloses any possible cracks that might have escaped notice. Finally the entire outside is painted, and then another group undertakes the installation of the controls, the internal bracing, the radio telephone apparatus and the instrument board. The fireproof mail compartment of duralumin is installed, the floor boards are set, part of the interior trimming is put in place and then the fairing that holds the fabric and inside walls, the fuel and oil system, the pilot's cockpit and part of the instrument board are added. Later, the fuselage, with small wheels, having but one engine and no wing, is rolled into the paint shop.

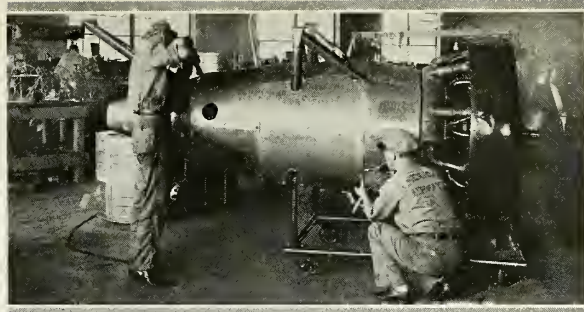
Toward the front of the room by the entrance door was equipment sufficient to operate a small planing mill. Bandsaws, saw tables, jointers, planers, shapers and other wood-working tools, manned by expert woodworkers, produced every piece of the woodwork for the planes. There were stacks of different kinds of woods, including Sitka spruce from Alaska, which would be used in the wings, and green ash from Texas, which furnishes material for the bent wood parts of the ships, the wing and fin tips. There was also balsa from the tropics, native pine, northern maple, northwestern fir, Oregon white cedar, poplar for lightness as a plywood filler, African mahogany for interior trimmings, walnut for moulding.

At the far end of the room was a group of sheet metal workers and welders who turned out practically all of the metal work.

In the paint and covering department, which despite suction fans, smelled strongly of "dope" and banana oil, parachutes for the pilots of the single-seated mail planes, which carry no passengers and fly day and night, were hanging from the rafters, ballooned out and undergoing inspections. Later they were to be washed, ironed and repacked by riggers licensed by the Department of Commerce.

Two tailors were in front of a long bench with sewing machines at work on a great mass of fabric, which was to become a wing covering. The fabric envelope, when finished, later would be attached and the nitro-cellulose paint would waterproof and tighten it in one operation. Lacquer would then be sprayed on. Ten men were busy in the paint and covering department; several were spraying the fuselage of the plane turned over to them.

The engine overhaul department had thirty-five men busy with the 425- and 575-horsepower Wasp and Hornet engines. With each ship averaging approximately six hours per day of flight, each engine must be removed every forty to fifty days, when it has accumulated its 250 hours of flight. They are placed on a rolling carriage specially



Assembling the cowling on a trimotor engine nacelle

designed in the Dallas shops, wheeled into the engine overhaul department and there dismantled. They are torn down and the parts placed in order on a four-foot-square rolling rack. Then a preliminary inspection is given and the worn parts discarded. All remaining parts are cleaned and an inspector measures each one with a micrometer, microscope or caliper, as the importance of the unit requires. Every part not within the limits of variance of new ones (five ten-thousandths of an inch for some parts such as crankshafts, and two to three ten-thousandths of an inch on such parts as cylinders) is cast aside.

When the inspector has finished his work, there remain two orderly groups of parts, one to be discarded, one to be retained. Then begins the reassembling the engine, with new parts from the stock room as required by the inspector's chart. After the assembly, the engines are not placed on the ships, but go on a moving crane to the test room where they are bolted on steel test blocks. Outside of this room a mechanic watches a board which contains twenty-nine indicators to record the performance of the engines and the conditions of the test. From six to ten hours they are run at approximately 1,000 revolutions per minute on the test blocks to break them in and to check them for service, one half an hour of that time at full throttle.

Accompanying each engine is the log book, which follows it from the overhaul department. The log shows the history of the engine from the day it was received from the Pratt & Whitney factory in Hartford. The original of each form is placed in the master log book, one duplicate retained in the engine overhaul department, while another is sent to the general offices of American Airways in New York.



Constructing the 180-gallon fuel tank for a Fokker trimotor



Single-engine Pilgrim used on some American Airways routes

In the propeller department regular inspection of propellers, which includes removal from the engines, disassembly and microscopic examination of the parts, is made after every fifty hours in the air, but at 300 hours propellers go through a process similar to the motors. After they are torn down, the hub and all steel parts are microscopically inspected, then plated. The duralumin blades are then placed in caustic, which blackens them, and then immersed in an acid bath which brightens, but reveals cracks, which remain black. The propeller thus treated is given a minute microscopic examination. A blade with a crack in it goes to the junk heap.

If no defects are found in the blades, they are placed on a rebuffering wheel and are polished. If the blades are bent, they are straightened on a machine with forty tons pressure; then are reassembled, given the proper pitch, placed on a balancing stand and brought to a perfect balance both vertically and horizontally, after which they have the date and initials of the mechanics painted on them and are put into stock.

While other units of the plane are going through their various rebuilding and inspection processes, another operation is being carried through simultaneously. The instruments, carburetor, starters, and other like appliances, are going through a department all their own. The instrument tests are made by a watchmaker who has been given special training in aviation instruments, and whose machinery of testing has largely been constructed by himself. For instance, there was an altimeter tested for 50,000 feet in a bell jar, which gradually reduced the air pressure through means of a vacuum pump, and an expensive compass, tested in specially prepared oil not affected by the atmosphere. The latter was junked because it responded somewhat sluggishly to a magnet being drawn around the



Fokker trimotor of the type rebuilt at the Dallas shop

outside. A speed indicator was tested up to 250 miles and a master tester, composed of half watch and half speedometer was checking a tachometer. Watches may go years without being inspected, but because of the vibration and ranges of temperature from seventy degrees at the surface to freezing at 10,000 feet, airplane instruments must have frequent inspection.

Outside the instrument room was a metal sand blast house where exhaust pipes, cylinders and other small parts that become encrusted with carbon are cleaned with fine sand which is used under air pressure as a cleaning agent.

The walls of the building were lined with rubber, the only material that will withstand the effect of the sand blast. Above, the woodwork was eaten away with only the grain remaining, the pith having been dissolved by the backwash of the sand. A blower moves the dust out of the room to a water-sprayed receptacle from which the wet dust is regularly removed.

There is a laboratory where gasoline from each station and oil from each shipment is analyzed before acceptance. Weekly tests are also made of gasoline at each refueling stop. The writer saw small cans from Brownsville, Los Angeles and Atlanta received that morning.

The machine shop contains lathes and equipment worthy of a tool factory. New bearings are fitted and nuts, bolts and brass fittings made, not only for the Southern Division but for the entire American Airways system. In the plating department black bolts and fittings are silvered only a few seconds after the current is turned on. All fittings for the ships are silvered and rust-proofed while the planes and engines are being rebuilt.

H. B. (Pete) Taylor, foreman of the shops, is the inventive genius of the shop. The improvements he has made are visible everywhere. For example, the original air intake at the bottom of the plane drew in dust that scored the engine. Taylor removed it and placed it on top where pure air enters. When the radio-telephone came out Taylor designed metal conduits of aluminum, aluminum switch boxes, and magneto elbows of the same material to prevent radio interference. In addition, every wire is shielded. Tail skids, which are hard on ships and runways, have been replaced with two small wheels of Taylor's invention, and in the pilot's cockpit he has rearranged the tachometer, fuel and oil pressure gauges, temperature gauges, air speed indicator, rate of climb indicator, so that at normal cruising all indicators are horizontal and point to the left. A glance at the instrument board and the pilot knows if all is well.

Several days later a visit to the shop disclosed the final assembly of the rebuilt plane. In the room where the wing came off, still on small wheels, is the fuselage of an apparently new plane resplendent in orange and blue. Mechanics had finished the installation of the windows, the seats, the radio. Engines and nacelles on their carriages are rolled in, the landing gear with shoulder-high tires is assembled, and the wing swung up on the conveyor. The ship itself is lifted in position, the landing gear slipped underneath, the wing lowered to fit on the center bolts and the two outboard engines elevated into position.

These operations move simultaneously to bring the component parts together, and a new airplane is created. A few days of tightening, inspection and test flying, and the plane is ready to take off with a load of six tons of passengers, mail and baggage to fly at an average speed of 110 miles an hour.



# EDITORIALS

## BUREAU OF NO NATIONAL DEFENSE

GENERAL DOUGLAS MACARTHUR, in referring to cuts made by the Bureau of the Budget of nearly five millions for the procurement of airplanes, said:

"This will leave the Army approximately two hundred planes short of the number which under the law should be available during the fiscal year of 1933. This cut was not recommended by the War Department. Already the Army is one year behind in the plan and this will prolong the program still another year."

That admission by the Chief of Staff that the mandate of Congress has been overruled by the Bureau of the Budget is a worthy subject for the Military Affairs Committee to investigate. The Morrow Board reported to Congress certain recommendations; Congress accepted them and supposed that it was putting them into effect under the so-called Five Year Program.

What value had the investigation and what value has the law if the Bureau of the Budget can nullify them both by refusing to give the Army money sufficient to carry out the recommendations made by the investigation and accepted, approved and provided for by Congress? If we investigate it we shall find that the spirit of the law has not been fulfilled in any way. And that the Bureau of the Budget has become, at least as far as aircraft are concerned, a Bureau of No National Defense.

As a matter of fact we are many times two hundred planes short of what Congress intended we should have at this time.

The country needs the planes. A developed and continually developing Air Force is the one thing most essential to its safety. And the aeronautical industry needs the business.

The President should see that his Bureau of the Budget does not effectuate "economies" which are contrary to the mandates of Congress. Or, perhaps, if the Bureau of the Budget is to run the Army, it might be better to abolish the Secretary of War and the General Staff and save the taxpayers the cost of their upkeep.

## AGAIN THE BUDGET

POSTMASTER GENERAL BROWN, undoubtedly at the instance of the Bureau of Budgets, which in turn is urged on by President Hoover's economy program, is utilizing the discretion given him by the Watres Act, and at this writing has the operators of the Air Mail again camping in Washington in one of his "secret conferences." They are "working out a way to overcome" a deficit of \$600,000 which threatens the Air Mail.

A clause in the law gives the Postmaster General authority to reduce rates whenever it is shown that the combined passenger and mail income are high enough to justify such action. The President evidently believes that the earnings of the air mail companies are sufficient to warrant this action. He could find out to the contrary with little effort.

The time the men will have to devote to this needless effort to prevent the deficit which the Post Office Department has to face will be worth far more than the deficit will cost the Government. What the Air Mail has done for the progress of the country has been worth a hundred times as much. The Postmaster General should and undoubtedly would be able to get from Congress by means of a deficiency bill whatever deficit the air mail operations show, had not the so-called Economy Program been used as a means to retard the Air Mail.

Provisions should be made so the operators of Air Mail may be permitted to operate air mail instead of rushing back and forth between Washington and their distant places of business.

The Air Mail operators spent the better part of last year working out a method of payment for the services they render and it looks as if they would spend a good part of the year just born in a somewhat similar manner.

## FOOD FOR BINGHAM THOUGHT

WE have been looking over the services to aviation performed by the National Exchange Clubs, a non-flying organization of American businessmen who merely have the nation's welfare and their own prosperity at heart. After having searched in vain for any list of helpful deeds to flying done by the National Aeronautic Association under Hire'em Bingham's alleged expert guidance, it stuns us to find that this non-flying organization, out of sheer appreciation of the firm link between flight and the country's progress, should have sponsored 324 airports or emergency landing fields; equipped 118 airports or emergency landing fields; furnished 673 air markers or signals to be placed on roofs or highways; staged 1347 events, such as air shows, aviation banquets, public assemblies, etc., devised to promote American air-mindedness; launched or planned 671 other air projects.

This is a subject (our suggestion is made with all due reverence) which Hire'em Bingham well might discuss with Mr. J. P. Muller, who is an ex-national president of the Exchange Club, and who inaugurated the movement which has made it so magnificently up-to-date, so absolutely unbinghamesque.

We know Mr. Muller. His offices happen to be under the same roof that shelters AERO DIGEST, and we very modestly point out that his first active interest in the art and industry of human flight was aroused when, as a guest of AERO DIGEST, he participated in an aeronautical event celebratory of the Ford Tour's only visit to New York.

We mentioned briefly what the Exchange Club, which is *not* an aeronautical organization, has done for aeronautics.

The reason is that the Exchange Club always elects an active head, and that no organization can be better than the head controlling the hand that guides it.

# BIPLANE EFFECT IN NOSE DIVE ANALYSES

## Some Aerodynamic Considerations in Nose Dive Structural Calculations

By

Dr. Michael Watter

**T**HE problem dealt with in this article limits itself in importance mainly to military aircraft of the biplane type designed to withstand diving as a part of regular tactical flying. It is intended to invite attention to the available data on biplane effect which, if not taken into account in nose dive calculations of biplanes, may lead to inadequate strength of lower wing beams and possibly other parts of the structure.

**I**N connection with the design of up-to-date high performance aircraft and particularly because of the development of diving attack aircraft, it is important that proper consideration be given to load and pressure distributions as affected by aerodynamic interferences.

In the light of present experience, it appears that the proper evaluation of loads and couples in a nose dive is of paramount importance especially in relation to biplanes.

The lack of sufficient data prevented including a study of biplanes with decalage and therefore this article deals only with cases of cells with different stagger and gap to chord ratios. The results of this study may be of importance not only in nose dive calculations but may have to be considered in the condition of low angle of attack as well.

In the NACA T.R. 364, Richard V. Rhode states that while the influence of biplane effect on the center of pressure is not an unknown phenomenon, thus far it has not been taken into account in the design rules; the importance of this phenomenon should not be overlooked.

That statement may explain and indicate much in connection with the design of biplanes suitable for and capable of meeting nose dive requirements. With that object in mind a brief study was made of available theories and

data on biplanes. Theoretical calculations, however, are not sufficiently reliable and the work involved is too lengthy and tedious for practical purposes. Therefore only the results of limited available experimental data will be given here.

The most recent tests conducted on biplanes are reported in NACA T.R. 256 by Dr. Max M. Munk. The experiments were made with RAF 15 and USA T.S. 5 airfoils, but unfortunately the moment coefficient data on isolated airfoils is not included. For the RAF 15 airfoil this data was obtained from the NACA T.R. 331 by F. A. Loudon. The VL of the tests are slightly different but because of good agreement in polars it will be sufficiently accurate to use the moment curve as given in T. R. 331. In figure 1 are shown the two polar diagrams and the moment coefficients from the data given in the two named reports. From the information obtainable from T.R. 256 the tests presented here were limited to cell arrangement more closely approximating conditions actually met in practice. Table 1 reproduces the data for the range of low angles of attack. Moment curves were faired since it was found that in one or two cases the points were widely scattered. Because of the limited number of tests and the fact that

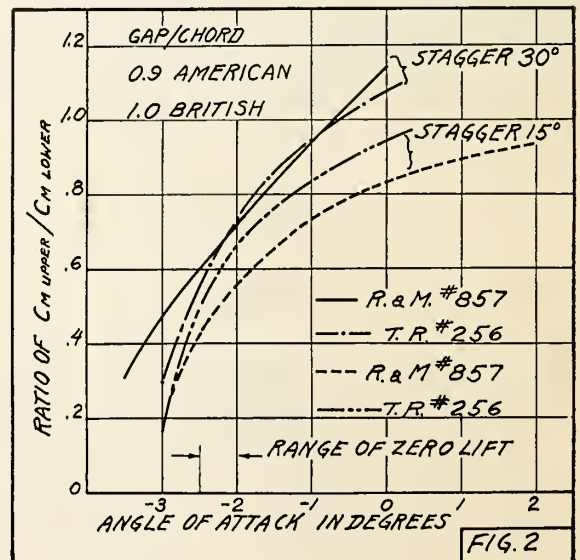
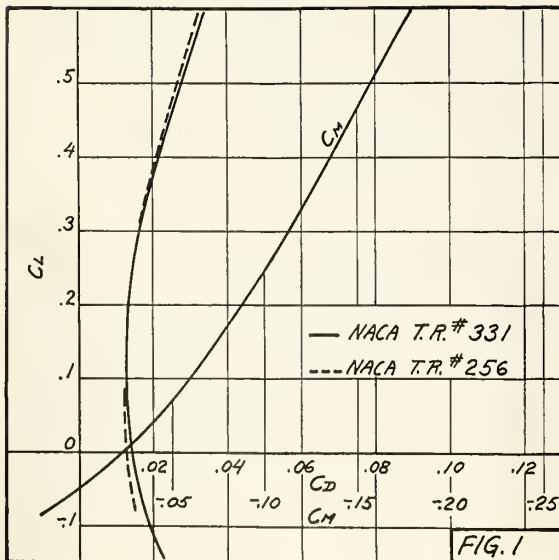


TABLE I. (Reference NACA T. R. 256) R. A. F. 15 Airfoil

$\alpha^\circ$	Monoplane		Stagger $0^\circ$						Stagger $+15^\circ$				Stagger $+30^\circ$	
			$g/c = .8$ (1)		$g/c = 1.0$ (2)		$g/c = 1.2$ (3)		$g/c = .9$ (4)		$g/c = 1.2$ (5)		$g/c = .9$ (6)	
	$C_{L\ mon}$	$C_{M\ mon}$	$C_{LB}$	$C_{ML}$	$C_{LB}$	$C_{ML}$	$C_{LB}$	$C_{ML}$	$C_{LB}$	$C_{ML}$	$C_{LB}$	$C_{ML}$	$C_{LB}$	$C_{ML}$
-3	-.050	+.008	-.050	-.026	-.060	-.028	-.060	-.020	-.035	-.025	-.040	-.003	-.040	-.030
-2.5	...	-.013	...	-.037	...	-.038	...	-.030	...	-.035	...	-.022	...	-.038
-2	+.025	-.032	+.002	-.047	+.003	-.049	+.010	-.042	+.030	-.044	+.030	-.036	+.030	-.046
-1	.110	-.064	-.060	-.066	.065	-.068	.075	-.060	.095	-.063	.095	-.058	.095	-.060
0	.192	-.087	.118	-.083	.118	-.087	.140	-.078	.158	-.078	.165	-.077	.165	-.074
1	.271	-.107	.170	-.100	.172	-.101	.203	-.094	.224	-.093	.230	-.093	.230	-.087
2	.351	-.125	.225	-.114	.227	-.115	.266	-.107	.287	-.107	.300	-.108	.300	-.098
3	.430	-.142	.270	-.126	.275	-.128	.330	-.124	.350	-.120	.362	-.125	.362	-.110

Ratio of Moment Coefficients of an Isolated Airfoil to Moment Coefficients of the Lower Wing

Table 2 (Based on American Tests). See Table I above

$C_L$	(1)	(2)	(3)	(4)	(5)	(6)	mean
-.050	-.320	-.267	-.344	-.364	-.285	-.285	-.40
-.020	+.306	+.275	+.344	+.366	+.845	+.324	+.39
+.025	.615	.581	.710	.744	.940	.710	.73
.110	.790	.771	.915	.970	1.030	1.000	.91
.193	.828	.820	.945	1.000	1.035	1.085	.95
.272	.855	.855	.965	1.030	1.035	1.125	.98

Table 3 (Based on British Tests)

$C_L$	Stag. $+15^\circ$	Stag. $+29^\circ$	mean
-.050	-.390	-.445	-.42
-.020	+.368	+.415	+.39
+.025	.735	.854	.79
.110	.942	1.160	1.05
.193	.972	1.220	1.09
.272	1.012	1.260	1.14

they are all based on the RAF airfoil, no attempt was made to interpret the data as a function of gap to chord ratio or of stagger. It is possible that similarly to the load distribution on the upper and lower wings of a biplane cell it may be best to analyze the results in that light, but since the purpose of this article is to illustrate only the importance of the moment increase on the lower wing, the results were combined and an average increase obtained. The comparison of moments is made by plotting them against the lift coefficient since zero lift angle varies for different biplane combinations.

Table 2 gives the ratio of the moment coefficient for an isolated airfoil to the moment coefficient of the lower wing in a biplane cell. It will be noticed that out of six tests reported here, all but one are in a very good agreement. It may be well to point out that from all the tests analyzed it would appear that cell arrangements with a gap to chord ratio of 1.2 (irrespective of stagger) seem to indicate a smaller increase in lower wing moment coefficient than other combinations with smaller gap to chord ratios. This phenomenon may be explained by a reduction in interference between upper and lower wing with increase in gap which is quite to be expected. However, no definite conclusion in this regard can be made from the limited data at the writer's disposal.

From figure 3 it can be seen that the error in calculating the lower wing moment at zero lift, neglecting the biplane effect, may be about 75 per cent while at very small negative values of lift it may be more than 100 per cent.

Further confirmation of this important effect of biplane interference is also found in some publications and tests made abroad. Tests on the SE-5 cell reported in British R & M 366 show that for a lift coefficient of about .146 the center of pressure on the lower wing is 64 per cent of the chord while for the monoplane wing it is about 50 per cent. Additional useful information on this subject is found in R & M 857. No information is given, however, of the characteristics of the isolated RAF 15 airfoil used in the cell combinations. Since the ratios of the upper and lower wing moment coefficients for the same type of cell are in a fairly good agreement with our own tests (see figure 2) it was assumed that for illustrative purposes the use of the monoplane data given in NACA T.R. 331 was justified. Table 3 gives the average value of ratios of monoplane moment coefficient to that of lower wing in a biplane cell (gap to chord ratio of 1) calculated as before. The results are in excellent agreement at the zero lift point and for low positive and negative values of lift coefficient.

The quantitative results of this brief study indicate the importance of the biplane effect in nose dive calculations and suggest a few more points which may have to be considered in such an analysis. Aside from more complicated problems of torsional rigidity of the cell as a whole, wing flutter (either inherent or induced) and adequate tail strength, it may be that individual torsional stiffness of each wing of a cell must be given serious consideration. The unequal torsional deflection may induce decalage leading to still

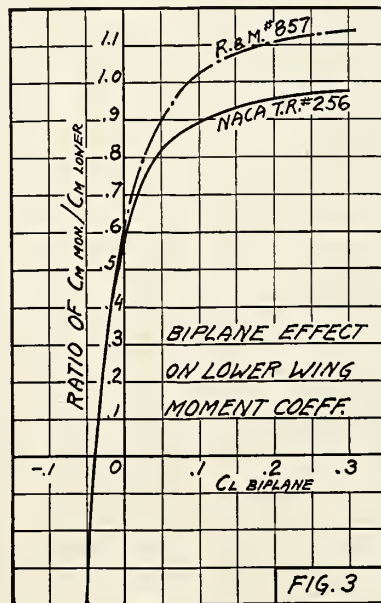


FIG. 3

(Continued on page 96)

# THE WING SECTION DRAG

Dr. Max M. Munk's Nineteenth Article on the Principles of Aerodynamics

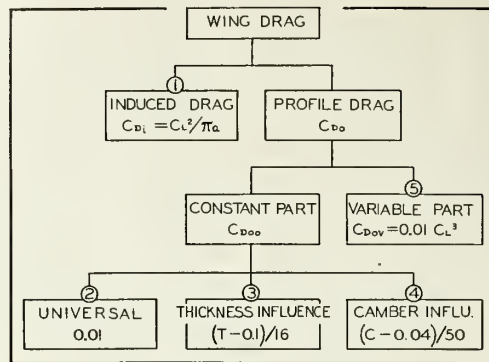
**T**HE drag of the wings themselves is an important item in the energy balance of the airplane. Airplane designers should become familiar with the magnitude of this drag, for there is the most promising place for further improvement.

Theory suggests a division of the wing drag into the theoretical induced drag and the empirical profile drag; it is for experimental research to establish rules for the correct computation of both kinds. For the induced drag theory suggests a numerical value for its magnitude under the assumption that the lift distribution along the span complies with a certain standard distribution. The theory can be (and actually has been) expanded to handle distributions not standard, but it then becomes too clumsy and unfit for practical use, and except for very special applications may as well not exist. Experimental research must establish whether the theoretical induced drag is exact enough for all practical cases, whatever the distribution of the lift may be.

As a matter of fact it is of no importance to the engineer whether the induced drag as suggested by theory is theoretically correct, as long as it performs its main function and requirement. The purpose of the induced drag is to eliminate the effect of the aspect ratio on the drag and to convert drag data from one aspect ratio into drag data for another one. Any practical check on the induced drag must be a check on its converting use. Experience shows now that the simple induced drag as given by primitive theory is sufficient for that purpose. In figure 1 test data are plotted showing the drag coefficients of several wings plotted against their lift coefficient. All wings have the same wing section, but different aspect ratios. In figure 2 the same data are plotted after the theoretical formula had been applied to convert all data for the same aspect ratio, 6. In figure 1 the test data are represented by different curves, spreading out over the diagram. If the method of conversion is satisfactory, the conversion should crowd all curves together to occupy only a single curve and to coincide with each other. Figure 2 shows that the method accomplishes this satisfactorily. It does so, although the wing had rectangular plan form, and although such plan view will not produce the standard lift distribution over the span.

The designer can therefore adopt with confidence the induced drag  $\frac{L^2}{\pi a}$  in his work, and charge the remaining

drag of the wing to the so-called profile drag, whether or not all of it is actually profile drag. The secondary induced drag, caused by the deviation of the lift distribution



Schematic distribution of wing drag coefficient

from the standard lift distribution along the span, seems to be small and fairly uniform with different wing sections and different plan forms. Its separation from the profile drag proper is not only very difficult, but rather unnecessary. For practical use, we define the entire difference between the complete wing drag and the induced drag of the primitive theory as profile drag.

This profile drag (or its coefficient), must be determined by measurements for each new

section. Further improvements in wing sections can be obtained only by systematic measurements, with the object of developing or discovering sections superior in their aerodynamic properties to conventional wing sections. They have to be a great deal better than the best wing sections we are familiar with at the present time.

For the purpose of performance calculations of airplanes, or for the discussion of general questions, the profile drag of conventional wing sections can be estimated or computed from previous experience by the use of simple empirical formulas constituting the outcome of a statistical analysis of the results obtained. These simple relations are of great practical value, although they are not strictly true; at least they show what has been accomplished so far and what can be reasonably expected.

For the purpose of this estimate, the profile drag coefficient of the wing section is divided into the sum of a constant profile drag coefficient that is constant for all angles of attack, and one that is variable. The division of the wing drag coefficient is represented in the diagram on the opposite page. The constant or minimum profile drag,  $C_{Dp0}$ , is of the order of magnitude of 0.01. As profile drag one hundredth is not bad as an assumption for the performance estimate under most favorable conditions. More exact estimates include the effect of the thickness and of the camber. Otherwise expressed, the constant profile drag is again divided into three values. The first is the basic value 0.01 for sections with small camber, and a thickness 10% of the chord. For a difference between the actual thickness and this 10% add or subtract 1/16 of the difference. For instance, if the thickness is 20% = 0.20, the difference is 0.10, and this divided by 16 must be added to 0.010, giving a constant profile drag of 0.016. Again, if the thickness is 8%, 0.02 divided by 16 should be subtracted from 0.01 giving 0.0088. However, not less than 0.006 should be taken, even with extremely thin wings.

This refers to a camber of about 4% of the chord. For a larger camber, take one tenth of the difference more profile drag, but do not give credit for a lower camber. Hence, if  $T$  denotes the thickness in fraction of the chord, and  $C$

the camber, in the same way, the minimum profile drag can be expressed as  $C_{D_0} = 0.01 + (T - 0.1) / 16 + (C - 0.04) / 10$  if  $C$  be  $> 0.04$ . Otherwise the last term is omitted.

We proceed to the variable portion of the profile drag. All conventional wing sections have practically constant profile drag up to one half of the maximum lift coefficient. Beyond that point, the profile drag begins to increase, assuming, in average, almost four times its original value at the burbling point. This relation is approximated by allowing an additional profile drag proportional to the sixth power of the relative lift coefficient. The expression  $0.01 C_L^3$  for the additional profile drag is probably exact enough for most practical cases and is relatively convenient for us to use.

These empirical formulas refer to the full size wing. Model tests of the ordinary kind generally show too large profile drags. All formulas and their mutual relation are shown by the chart on the preceding page, and patience will overcome the confusing effect of dividing the resistance into so many parts. This is unavoidable if the effects of so many influences have to be taken into account, and the manner of splitting up is indeed the simplest way possible, and chosen chiefly for its simplicity rather than for its inherent correctness. There are only five terms in all—one for the induced drag, one for the variable profile drag and three for the constant profile drag, being the universal term, the thickness term and the camber term.

Exactness of the profile drag coefficient is much more important at small lift coefficients than at large ones, because at small lift coefficients the profile drag constitutes a considerable portion of the entire airplane drag. At higher lift coefficients the profile drag becomes a smaller and smaller portion of the entire drag, because then the induced drag and the gravity component of a climbing airplane become dominant. For many practical purposes it is therefore admissible to neglect the variable portion of the profile drag coefficient and to treat it as constant. An intermediate course consists in considering the variable portion of the profile drag coefficient proportional to the square of the lift coefficient, although actually it increases more rapidly. The variable portion of the profile drag coefficient then becomes proportional to the induced drag coefficient which is likewise proportional to the square of the lift coefficient. This drag can therefore be taken care of without any additional computation work merely by using an aspect ratio smaller than the actual or effective aspect ratio. We assume the variable portion of the profile drag coefficient to be equal to  $0.01 C_L^2$ .

The problem is now to find an aspect

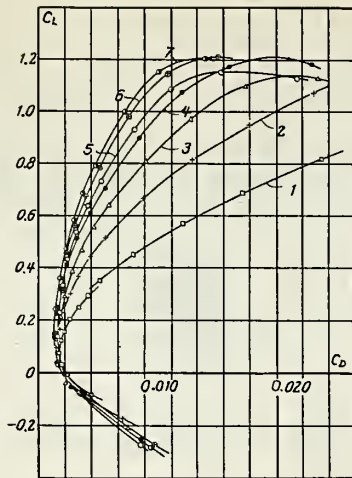


Figure 1. Measured drag of wings with different ratio of the chord to the span, plotted against the lift

ratio  $\alpha$  such that the sum of the above profile drag and induced drag is equal to the induced drag computed from the ratio  $\alpha^2$ . That is,

$$\frac{C_L^2}{a' \pi} = \frac{C_L^2}{a \pi} + 0.01 C_L^2$$

This equation is solved by putting  $a' = a (1 + \frac{0.01 \pi a}{a})$ , or exact enough

$a' = a - 0.01 \pi a$ . The aspect ratio would therefore be reduced as follows:

Actual Ratio	Ratio Used
10	6.8
8	6.0
6	4.9
4	3.5

The entire drag coefficient now assumes the form  $C_D = A + B C_L^2$  where A and B are constant. The actual polar curve is replaced by a parabola. This is of course only an approximation, and good only up to the burble point.

It is pertinent to remark at this point that the aspect ratio used for the computation of the wing forces should be computed by using the entire span of the wing, including a gap filled up by the fuselage, if any. The wing area used for the computation should also contain any such gap, with a chord of the wing. Experiments have shown that the fuselage placed between the wings takes over about as much lift as the wing cut away to accommodate the fuselage. This is indeed to be expected, since the pressure on top and bottom of the wing extends over the fuselage at wing region.

The drag coefficient of tail surfaces not inclined and without deflection of the control surface is of the same order of magnitude as the profile drag of the wings. When well streamlined, with a sharp trailing edge, the drag coefficient goes down as far as to 0.007 for 6% thickness and to 0.012 for extreme thickness. These values hold for a perfectly smooth hinge only. Ordinary tail surfaces with parallel sides and tubes in the rear edge have a minimum drag coefficient of about 0.02.

At reasonably large deflections of the control surface, the tail surfaces become very poor wing sections and assume a very large drag. The drag coefficient may then reach 0.10 and even 0.30, including the induced drag.

It is interesting to compare the minimum drag of the wing sections with a pure surface drag of plane surfaces; that is, the drag arising from tangential forces only. (Common air friction drag arises from both tangential and normal forces.) The separation of the friction drag into its tangential and normal constituents is of little practical interest and indeed difficult to do. These different parts of the friction drag however, are often mentioned in literature, and probably will play an important part in future scientific studies of the air friction.

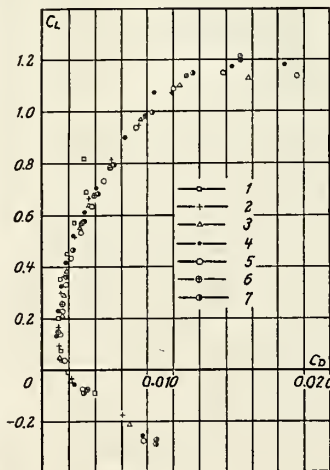


Figure 2. Drag for one aspect ratio computed from the drag of wings with different aspect ratio

(Continued on page 92)



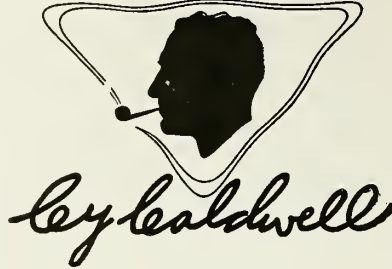
# PERSONALITIES

IT was a dark and dirty night in February of the year 1907. Amidst a raging blizzard the sinister form of a stork could be discerned, winging its way over the fields and woods of Michigan. It hovered in the air a moment to brush the snow out of its eyes, and then continued flapping on its way past the Battle Creek Sanitarium, until it alighted on the roof of an unfortunate resident of Battle Creek named Gage. "Quick, Henry, the Flit!" cried Mrs. Gage, sensing what was in the wind. But Mr. Gage was too late. The stork deposited the infant on the roof, watched him roll down into the gutter, and then, with a mournful cry of "Tweet, tweet, twe-e-t!" flapped its wings again and took off into the night.

Mr. Gage, somewhat non-plussed, retrieved the infant from the gutter, as he was fated to do many times during the ensuing years, and brought it inside, where it gradually grew to maturity, until to-day it is known as William C. Gage, Production Manager of the Gage Printing Co., Ltd., and Secretary of the Licensed Pilots Association at Battle Creek. However, on the road to this eminence, young Gage passed through various vicissitudes, which he describes in this vivid style:

"After the folks had seen what a pure imbecile I was going to turn into, they decided that a good way to ease themselves of me quickly was to let me take up flying for a profession, such as it is. As a result of this decision, 1927 found me at E. A. Johnson's field at Dayton, Ohio, groping my way around with good old Clyde Emerick, since deceased. This was in a powerful old Jenny, which I soloed after many weary hours. I then returned, out of funds, to the family fold to regain financial stability, for during the last of my course I had been flying one wing low and tail heavy, cashually speaking.

"Just about that time I met Major Floyd Evans and his operations officer, Lt. Walter E. Nicol, who were located at the old Redford outfit of the Michigan National Guard Air Service, near Detroit. They blew in with a couple of Consolidated P T 1 Hisso-powered jobs, and had been up to some place taking pictures. Through their assistance I became enamored with the possibilities of being sent to the Air Corps Photo Section at Chanute Field. So I made application for appointment as Cadet, which was to be my first step in making myself over into a first class Photographic Phlunkie in the Army Air Corps. The appointment went through, and I was ordered



to March Field, California, to start with the November class.

"After many farewell parties of a dubious and somewhat vulgar nature, I took leave from home and made strides toward becoming a real hot pilot (heh-heh!) and along with 110 other saps I started a very intensive course of training that demanded a lot of wide-awake intelligence and an alert mind. Well, I finally got that way, and after some forty or fifty hours of flying I got real HOT and did a bunch of zero-altitude flying over a girl's house in Riverside—a horrible mistake. Result: meeting of Benzine Board, Wash-out, much Wire-pulling. Back in again. Check rides—two weeks. Then—OUT! Oh well, who cares?"



Bill Gage— $\frac{1}{4}$  life size!

What Bill really needed at this point in his career was a war. In a war any kind of flying goes, and the wilder it is the more the commanding officer is apt to conclude that here, in this game chicken, is a red hot pursuit pilot. Or at least, so it went in the last war. I recall that during the last months of the war those young pilots who seemed more than ordinarily daring were shipped off to the front somewhat ahead of the standard brands, apparently under the reasoning that, as they were bound to kill themselves anyhow, they might as well get a crack at the enemy before they dismembered themselves. However, Bill Gage was short one war, so out he went into the cold hard world known as commercial aviation. But this was in Southern California, where the parks are quite comfortable to sleep in.

Tiring of the parks, however—for there are no cushions on park benches, even in sunny California—Bill adorned the Glendale Police Department until they found out what was wrong with it, when he returned to good old Battle Creek, his home town. In a Curtiss Robin for his company's photo work Bill flew hither and thither over the grand State of Michigan, trying to put a crimp in Ted Abrams business. No luck, he says. And in addition to his photographic flying he is Production Manager in the plant—so I guess he's settled down. He should be, for he is married, has a daughter over a year old, a new house, a Chevrolet, and the various other impedimenta that even wild young men seem to attach to themselves, including a bottle-capper and a twenty-gallon crock bought at a Sheriff's sale.

He is on the side of law and order, moreover, for he is in command of the Aerial Squadron of the Calhoun County Sheriff's Office, and is allowed to carry a gun. He has not even been in jail since the time that a bunch of the lads from Cadet School journeyed to Agua Caliente, where they became so enraptured with the climate or stimulated by the stars—Hennessy's three stars—that they shut off the water in the Agua Caliente Public Fountain.

When E. W. Kingsley was born, at Los Angeles, California, July 7, 1898, he weighed nine pounds; when he soloed, in March, 1921, he weighed 158 pounds; now, as Western Division operations manager for American Airways, he makes the scales quiver with apprehension at 230 pounds. There's progress for you! It shows that a persistent feeder can accomplish in thirty-

three years. He's one of the few pilots who ever got fat flying. On April 1, 1931, he had 4,200 hours, or one and one-sixth ounces per hour.

He went to school in Los Angeles when geography was a much simpler study than it is today. Now a school boy in Los Angeles spends two years memorizing all the airports around that sprawling city; then he takes up the subdivisions within thirty miles, then those within fifty miles, all of which takes years of study. By the time he



Bill Kingsley

gets to the geography of the rest of the world, it's time to graduate him. So the kid goes out into business unaware that there's any land or water except right around Los Angeles. That's the real explanation of why a man from

Los Angeles insists that Los Angeles is the only place in the world to live in—he doesn't even know they've built any other places.

But as I say, Kingsley graduated from High School before Los Angeles amounted to much—I don't believe it was much bigger than New York and London put together at that time—so he got a smattering of outside geography, and thus learned where San Diego was. It's a little place near Agua Caliente, I believe, though I'm not sure. Anyhow, it's the place the Navy was looking for one night in a fog some years ago, when they ran several destroyers on the rocks. I believe the trouble was that they'd found Agua Caliente first.

However, Bill Kingsley, coming from Los Angeles—which even at that distant date had been fully saved, at so much per soul, by the sainted Aimee—steered a straight course for the San Diego airport, and spent the next few months doing mechanical work in exchange for flying instruction. He soloed after three hours and forty-five minutes, survived, practiced on the trusting passengers, and in no time was a finished pilot. He was driven out by hunger several times, at first, but kept on coming back for more aeronautical suffering until 1926, when he operated the San Diego Airport. This was really the start of his collection of weight, because although he had put some on during the former five years, the intervals between meals had taken it off again. From 1926 on, however, he increased in stature and in favor with those who want to fly.

He barnstormed, made a complete photographic survey of the State of Arizona—no mean feat!—and in 1929 went with Standard Air Lines, later taken over by Western Air Express. In October, 1930, he joined American Airways as Western Division operation manager. From 1921 to 1929 he had flown over most of the West and South-west portions of the United States, and there

isn't much of it he hasn't seen. A wonderful country it is to look at from the air, too, and if you get a chance to travel over it, go by air—especially in summer, when the steel trains become bake-ovens. I went to the Los Angeles races by air, leaving Tucson when the thermometer said 112 on the ground. I went up to about 8,000, where it was 24 degrees cooler than it was on the ground, and was comfortable. Every time I passed a train crawling across that blistering desert, I felt even cooler by contrast. If Bill Kingsley wants to lose any of those 230 pounds, a good way to do it is to spend a month in summer traveling on the train between Tucson and Yuma.



**H**ERE'S Sister Margery Brown, with her soulful eyes and slightly dazed expression, as though she had just finished reading a report by the National Advisory Committee for Aeronautics. I knew a chap who read one of those reports and burst into tears, read a second and had a nervous breakdown, and had waded half way through a third when he suddenly jumped up and started picking pink crocodiles off the wall. Margery's expression, however, is due not to that but to being smacked in the face by a couple of large waves at Long Beach. Any wave over three feet tall is able to slap Margery in

the face, because she's just a pocket size pilot. As she was standing beside her plane one day, a policeman picked her up and carried her back of the ropes. "You children musn't play around the airplanes," he said severely.



Margery Brown

That's just what she will do, though. In this photo we find her in her helmet and a daze about to take the air in her Curtiss Robin with O X attachment on the front end. I believe since this picture was taken she has left the powerful O X for more horsepower.

Margery learned to fly in the fall of 1927 at old Curtiss Field under the paternal supervision of Bill Winston, who taught Lindbergh to fly, and under the maternal care of a Jenny, who taught all the rest of us. Surviving this combination Margery soloed, bought a Pitcairn Fleetwing, and sold it in 1929 to buy a cabin plane, which she flies only for pleasure. She does the service work necessary to overcome the O X 5's reluctance to revolve, and takes great pleasure even in that, so you see she's a simple little soul and not hard to please.

She was one of the founders of the "99" Club, devised, so she tells me, "to inspire

sex loyalty in women," whatever that means. So far as I've studied the matter, they're always loyal enough to each other where men are concerned. As a bunch they've been our enemies ever since the day Eve cheated Adam out of a rib, since which they've been moving en masse to collect the rest of the carcass. It seems to me, Margery, that we men have been easy enough victims, on the average, without you all having to band together for concerted action against us.

"Flying is teaching women that they can stick together," declaims Margery in one of her articles. Oh yes, she's a writer, too. She has written so much for women's magazines that girls write in to her in droves asking how they can get into aviation. When they get in, they write her again asking how they can survive it. I don't know what her answer is to that one, but if I get it I'll pass it along to some of the men. They'd like to know, too.

She's a good little scout, with a lot of decided ideas on life, and does all her own thinking, which is a cheering thing in a world of mostly standardized thought. She has devoted much time and work to the welfare of blind children. Many days when she could be flying or otherwise seeking entertainment she has spent trying to bring a little more happiness into the lives of children denied even a glimpse of this colorful old world. And the world is brighter for your presence, Margery.



Uncle Cuthbert says—"War is a diversion for the young. At eighteen a youngster will go to any old war he can get a crack at; at twenty-five he will fight in any war for "my country right or wrong—but right or wrong, my country"; at thirty he wants to be sure that his country not only is right, but really is in danger, before he even enlists; and at forty he's even willing to move out if they attack the place. There you are—the four ages of warfare. If you don't agree now, you will when you're forty."

A Correction

**M**Y friend Mr. Inglis M. Uppercu of the Uppercu-Burnelli Corporation calls my attention to an error of fact in my November article. I believed, and therefore stated, that I had carried the first United States air mail to a foreign country when I flew from Key West to Havana for Pan-American in October, 1927. Mr. Uppercu advises me that in 1920 the Aeromarine Airways, pioneer passenger line over that route, also carried air mail—a fact of which I was unaware until Mr. Uppercu, ever anxious to keep me on the straight and narrow path, so informed me. I therefore hasten to make this correction and accord the credit to Aeromarine Airways. Will you pardon my inadvertently misleading you?

# COMPASS ROSES FOR AIRPORTS

An Inexpensive Facility to Aid Cross-Country Fliers

By

Lt. Logan C. Ramsey, U.S.N.

ONE of the greatest deficiencies of American airports in general capable of being remedied without large expenditures, is the lack of certain aids to aerial navigation. The most important of these aids is a rose of magnetic directions for the determination of aircraft compass deviations.

In order that the compass may guide and not mislead the pilot, it is necessary that the errors of the compass be ascertained and available for the use of the pilot. The errors due to magnetic influences surrounding the compass mounting can be determined with the greatest degree of accuracy possible while the aircraft is on the ground. These determinations are made by comparison of the compass reading with the heading of the plane after alignment on a known magnetic direction. A circle, on which magnetic directions are marked, is known as a compass rose.

Because very few airports afford this facility, even in view of its simplicity of construction and moderate cost, its importance and necessity do not appear to be realized generally. A dissertation on this point lacks pertinency in this paper. However, the writer feels quite confident in venturing the opinion that eventually, the Department of Commerce will require evidence of competent compensation and deviation determination of all compasses on aircraft making flights of any distance from the home airport. The Steamship Inspection Service at present makes an analogous demand with respect to ocean-going steamers.

Naturally one would expect the United States Navy to appreciate fully the necessity for accurate determination of compass errors. That this expectation is justified is evidenced by the following extracts quoted from the manual of the naval Bureau of Aeronautics:

"Compasses shall be installed on all aircraft except those training planes which are not intended to make flights of more than fifteen miles from the station"; and "Compasses installed in aircraft shall be kept compensated, and a copy of the latest residual deviation table shall be posted in the plane. Copies of all deviation tables shall be forwarded promptly to the Bureau of Navigation (Naval Observatory). There shall be noted on the face of the forwarded copy a notation for the reason for the compensation, such as 'Routine,' 'After Changing Engines,' 'After Major Overhaul,' etc."

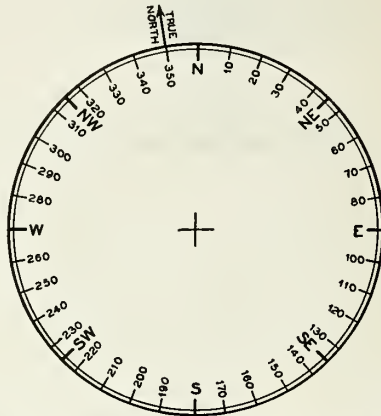
A compass rose may be constructed easily and cheaply. The actual cost depends on whether or not a suitable expanse of concrete already exists at the airport in question.

Steel or iron reinforced concrete, or concrete closer than 100 feet to a steel hangar or other metallic structures, is unsuitable from a magnetic standpoint. With respect to size, a circle of about thirty-five feet in diameter is adequate for the small airports; and for more important airports the size should be equal to the length of the fore-and-aft axis of the largest plane based there. If no suitable expanse of concrete exists in the front of the hangars, the best location is usually to be found near the end of existing construction or at a corner of the field presuming, in the latter case, that no power or lighting lines are adjacent. A thirty-six foot circle with a six-inch thickness requires approximately twenty cubic yards of concrete. This may be considered adequate in most instances.

The base being provided for, the actual delineation of the compass rose may be accomplished by either of two methods. In the first, or surveyor's method, the true meridian is determined by one of several methods, preferably by an observation of Polaris at elongation. Then, the magnetic needle of the transit is swung several times to determine if the local magnetic variation agrees with the value as ascertained by the Coast and Geodetic Survey for the vicinity. If no discrepancy is observed, the magnetic meridian is then drawn on the concrete by applying the local variation to the true meridian. Eleven other magnetic directions, each differing by thirty degrees, are then laid down. These thirteen directions should be painted in on the concrete with stripes not more than one inch in width. The true meridian should be painted red, while black will be found satisfactory for the magnetic directions. At any rate, whatever color scheme is chosen, the true meridian should be differentiated from the magnetic directions. Accompanying this paper is a sketch of a compass rose drawn for a local magnetic variation of ten degrees east.

The second method of compass rose construction, which may be employed if it is desired to avoid the payment of a surveyor's fee, is as follows. The center of the proposed rose is clearly marked and a straight rod of about six feet in length is erected or held vertically to the ground. The observer must be provided with a watch which has been set accurately (to the nearest second) with the prevailing local civil time. Western Union time or the radio time signals from Arlington should be used for this purpose. At any moment when the sun is shining clearly the time should be noted accurately and the center of the shadow cast by the


(Continued on page 42)



Sketch of compass rose drawn for local magnetic variation of ten degrees east



*Here's what  
the President  
of  
PITTSBURGH  
AVIATION  
INDUSTRIES  
CORPORATION  
thinks about  
AIRWHEELS*

  
**PITTSBURGH AVIATION INDUSTRIES CORPORATION**  
 PENN SCHOOL OF AVIATION  
*Federal and State Approved*  
 TRANSCONTINENTAL & WESTERN AIR, INC. *Affiliated with*  
 724 OLIVER BUILDING *Daily Service to New York and Los Angeles*  
 ATLANTIC 0816 *PENNSYLVANIA AIRLINES*  
 PITTSBURGH, PA. *Daily Service to Cleveland and Washington*

November 30, 1931

Goodyear Tire & Rubber Company,  
Akron, Ohio.

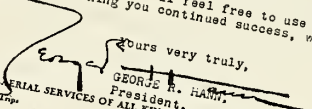
Gentlemen:-

Two years ago Goodyear Airwheels were installed on the fleet training planes of our Penn School of Aviation Division, and we have nothing but praise for the excellent manner in which they have served. Penn School files an average of 250 student hours per month at its Pittsburgh-Butler, Bettis and Harrisburg bases, and it is estimated that air wheels, by the elimination of ground-loops, excessive strains and other minor mishaps of student flying, have reduced our maintenance costs by approximately \$300 per month. Furthermore, the confidence which they inspire in the student pilot has been, in a large measure, responsible for the school's remarkable record of 100% success in Department of Commerce flying tests.

The results achieved on our Pennsylvania Airlines Division, since the tri-motors used on the line were equipped with Airwheels, have also been highly gratifying. Not only has the weight been reduced, but also the handling of planes on the ground has been facilitated, the hazard of wet and muddy fields reduced immeasurably.

Our experience with Airwheels ranges from the smallest light plane to tri-motors, and you may be sure that we shall have not the slightest hesitation in recommending them to any aircraft owner.

We sincerely hope you will feel free to use this letter if you so desire, and wishing you continued success, we are

Yours very truly,  
  
**GEORGE R. HAHN,**  
 President,  
 SERIAL SERVICES OF ALL KINDS.  
Light Service and Charter Traps  
 PITTSBURGH-BUTLER AIRPORT  
 Aerial Photographs and Surveys  
 Airplane Sales, Overhaul and Repair  
 HARRISBURG AIRPORT



Don't miss these two high spots:  
 "Airwheels, by the elimination of ground-loops, excessive strains and other minor mishaps of student flying, have reduced our maintenance cost by approximately \$300 per month."

"Since the tri-motors used on the

line were equipped with Airwheels... the weight has been reduced... the handling of planes on the ground has been facilitated, the hazard of wet and muddy fields reduced immeasurably."

For all the facts about Airwheels, write to Goodyear, Akron, Ohio, or Los Angeles, California.

*When you buy a new ship specify Goodyear Airwheels*



**EVERYTHING IN RUBBER FOR THE AIRPLANE**

**TUNE IN:**  
 Goodyear invites you to hear John Philip Sousa and his Band... Arthur Pryor and his Band... Goodyear Quartet and Concert-Dance Orchestra—every Wednesday and Saturday night, over N. B. C. Red Network, WEAF and Associated Stations

(Continued from page 40)

rod marked clearly. As a check, a second observation should be made about two hours later. For the first observation, either early morning or late afternoon is preferable as the shadows cast then are longer, thus reducing the possibility of mechanical error.

At this point, two methods of further procedure are available. The data regarding the times of observation, the locality of the airport, and the date of the observations may be given to any competent navigator (either aerial or maritime) with a request that the direction of the shadows cast by the rod be determined. As these directions are merely the reciprocals of the azimuths of the sun, the astronomical calculations involved are very simple. Navigators will be quite willing to perform this service for a nominal fee, say, about ten dollars.

However, airport managers have the intelligence and ability to make these calculations and save part of this small expense if so inclined. The exact latitude and longitude of the airport, together with the local magnetic variation, may be obtained upon request from the Coast and Geodetic Survey in Washington. It will then be necessary to purchase the American Nautical Almanac (obtainable from the Superintendent of Documents at Washington for fifteen cents) and either the American Practical Navigator (Naval Hydrographic Office at Washington—price \$2.25) or some standard text on aerial navigation (under \$5.00). This expenditure is not entirely chargeable against the compass rose project as these texts will be found useful for other purposes and are quite handy volumes to have around. At any rate, the method of ascertaining the azimuth of the sun will be found fully explained in these books. The true direction of the observed shadow having been determined, the corresponding magnetic direction is obtained by laying down a line differing from the line of the shadow by an angle equal to the local magnetic variation; measured to the right of the shadow line if the variation is easterly; and to the left if westerly. From this magnetic direction the complete magnetic compass rose may be drawn by simply measuring the proper angles from this reference line.

In order to afford a definite basis for study, the following estimates of cost are submitted.

Estimated Cost of Compass Rose (Maximum)	
20 cubic yards of concrete for making 35 foot circle with 6" thickness @ \$7.00 per cubic yard.	\$140.00
Surveyor's fee	50.00
Paint and incidental expenses	10.00
<hr/>	
Total cost (maximum)	\$200.00
Estimate of cost (median figure)	
Navigator's Fee	\$10.00
Paint and incidental expenses	10.00
<hr/>	
Total	\$20.00
Estimate of Minimum Cost	
Nautical Almanac	\$0.15
Text on Aerial Navigation	4.50
Azimuths of the Sun Table (Hydrographic Office)	1.00
Paint and Incidental expenses	5.00
<hr/>	
Total	\$10.55

So much for the method and costs of construction of this facility.

Such a compass rose may be made a source of income for any airport if its manager is willing to do a little missionary work, particularly among private owners. A fee may be charged professional pilots for the use of the rose. Fees also accrue from the compensation of compasses and the determination of deviations. As the methods involved in these processes are set forth in the texts on aerial navigation, the further utility of these volumes is apparent. One airport manager who established a compass rose at the suggestion of the writer at a total cost of \$45.00 reported an income during the past calendar year as follows:

Fees charged:

Use of rose by professional pilots	.....	\$1.00
Determination of Deviations	.....	7.50
Compensation of compass (including determination of residual deviations)	....	15.00
Total fees collected	.....	\$111.00

Expenses:

Cost of rose	.....	\$45.00
Labor used in aiding compensations of compasses, etc.	.....	52.00
Incidental Expenses	.....	4.00

Total Expenses.....\$101.00

Net profit.....\$10.00

However, his report of net profit neglects the fact that his compass rose is paid for and that all future income will, after deduction of expenses such as labor, etc., be clear profit. The quoted extracts from the Navy's requirements in this respect are effective in persuading pilots that their compasses require compensation.

Another navigational aid that will increase the efficiency of any airport is the provision of a large scale map of the vicinity of the airport. If such a map is placed on the wall of the operations office of the airport and a table appended showing the magnetic directions of various roads, railroads, etc., pilots departing on cross country flights are able to check their compasses and determine the proper compass heading to steer to reach their destination. For example, let us say that a railroad leading about east from town has an exact trend of 85 degrees magnetic. A pilot desires to make a flight to another airport which lies, according to his map, in a magnetic direction of 90 degrees from his base. If he flies along the railroad until he has determined his correct heading to make good that track, he has determined the angle between the magnetic direction and the direction in which his plane must be pointed. This angle is equal to the compass deviation on that heading plus the wind drift. Let us say that his heading while flying along the railroad is 105 degrees. The angle just described is therefore plus 20 degrees. The desired route is 90 degrees magnetic. The pilot therefore, can point his plane on a heading by compass of 90 plus 20 degrees or 110 degrees with confidence that, barring a shift of wind, this heading would bring him safely and expeditiously to his destination.



# NEW HORIZONS

The new year unfolds new horizons to aviation. In the year just past—a year of general business retrenchment, a year when steamship lines and railroads suffered costly decreases in traffic—air transport has forged steadily ahead. And 1932 will see still greater advances.

Many are the milestones along this pathway of progress. Greatly increased safety has gone hand in hand with higher speeds and heavier loads, for airline management has recognized the false economy of any compromise with quality. Contributing to this steady progress are Stanavo Aviation Gasoline and Stanavo Aviation Engine Oil, products designed expressly for aviation use, products which are available everywhere and known everywhere for their rigidly maintained standards of quality.

## STANAVO SPECIFICATION BOARD, INC.

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## THE SHUSHAN AIRPORT

By E. Allan Rice

**T**WELVE minutes from the City Hall on the south shore of Lake Pontchartrain, New Orleans is building one of the finest airports in the world to accommodate every type of modern airplane and seaplane. When completed it will meet the requirements of the Department of Commerce for an A-1-A class rating.

Concrete mixers and pile drivers are building a bulkhead into the lake enclosing a triangular shaped area of 310 acres, a mile and a half along the shore and over two miles around. Dredges are working day and night filling the inside of this bulkhead with sand from the bottom of the lake.

The State of Louisiana, through the Orleans Levee Board, is financing this \$2,000,000 development. To A. L. Shushan, president of the Orleans Levee Board, goes the credit for the accomplishment of a task more difficult than is usually encountered in even so large a project. His farsightedness and persistent efforts in overcoming apparently insurmountable legal obstacles have been rewarded by the beginning of actual construction. In his honor the airport has been named the Shushan Airport.

Plans for this undertaking have been designed and will be executed by the National Airport Engineering Company, Ltd., of Los Angeles, Cleveland, and New York, headed by William E. Arthur. John Klorer, Chief Engineer of the Orleans Levee Board, from his knowledge of engineering problems under local conditions, is giving valuable assistance in the design and construction of the airport.

A five-year building program has been planned and designed for the Shushan Airport, which anticipates the essential requirements for an airport of this magnitude over the ensuing five years. The initial development, to be completed within fourteen months, calls for an ex-

penditure of \$2,000,000 to supply adequately the immediate needs of the port. Under this development will be constructed three units of the seven units designed for the \$190,000 administration building, which is 360 feet by 90 feet, and two stories high with a control tower four stories high; two hangars, 200 feet by 120 feet; maintenance and emergency building, 60 feet by 128 feet; transformer building, 40 feet by 22 feet; repair and overhaul building, 100 feet by 120 feet; runways and lighting facilities for night flying and complete radio equipment.

Spanish Renaissance, a type of architecture that touches upon the romance of Old New Orleans, and is at the same time practical, has been chosen for the administration building. It is especially advantageous for this project in that it lends itself to additions without detracting from the original beauty. The exterior walls are hand-finished plaster with carved stone panels and wrought iron grilled balconies. The roof is of Spanish tile, and all exterior sash and doors are of Louisiana cypress.

The landscaping has been designed to harmonize with the Spanish Renaissance architecture and to give to the airport an artistic and beautiful appearance from both the ground and the air. This design shows the driveways lined with low shrubs and tall cypress trees. Red and yellow flowers in the parkway will give the entrance a colorful Spanish atmosphere. Where the driveways converge in front of the main building, there will be a large, low, graceful fountain of stone. Appropriate statuary in the small courts on either side of the main entrance, the low shrubs and tall

cypress trees will harmonize with the dull cream tones of the buildings.

As the first step in the development of this project, the National Airport Engineering Company's engineers made surveys upon the ground and from the air to determine the type of airport grades and levels and the position of runways for landing and take-off. These surveys are important, inasmuch as commercial planes of the future will be high speed airplanes cruising at 175 to 200 miles per hour, reaching the port in varied weather conditions. The airport has been designed so that the approach to the port can be made with the minimum of hazards and obstructions. Studies were made of the meteorological conditions of the airport site and surrounding terrain from observations at the present time, and from data accumulated over a period of years. In view of the extremely heavy rainfalls in this location, meteorological surveys are an important part of these preliminary investigation.

These surveys revealed one of the most difficult drainage problems in airport engineering, due to the varied elevations of water levels surrounding New Orleans. Though the city lies below the Mississippi River and below the high water mark of Lake Pontchartrain, the airport is being constructed so that the surfaces of the airport will be above these water levels.

Twenty-five feet inside the main bulkhead, a concrete wall six feet lower than the main bulkhead is being constructed. The area between the bulkhead and the wall is being filled with oyster shells. The porosity of the oyster shells will permit the water drained from the surface of the airport to this area to be carried off to the lake through weep holes in the outer bulkhead. In addition, a sub-surface drainage system has been constructed to carry sub-surface

waters from various parts of the airport to the Drainage Canal, a mile south of the airport.

From the aerial surveys data pertaining to the direction and conditions of prevailing winds, the wind-rose of the port was determined, from which the direction and type of runways were planned. There will be four runways, each 300 feet wide; one will be parallel to the east bulkhead for 4,000 feet, another will parallel the west bulkhead for 3,800 feet. A taxiway connects the ends of these two runways, completing the horseshoe. At right angles to these runways are two runways 3,600 feet and 3,700 feet respectively, forming an X at the opening of the triangle. This design enables planes to land or take off into the most advantageous wind and controls the movement of planes on the field preparatory to take-off and after landing.

The buildings of the Shushan Airport will be located in a graceful curve at the opening of the triangular-shaped bulkhead. The administration group, including administration building, maintenance and emergency building, and transformer building, is strategically situated in the middle of the group of buildings to facilitate the efficient handling of aerial and highway traffic. Extending at a slight angle on either side of the administration group are the hangars—four on one side and six on the other. At either end of the rows of hangars are the repair and overhaul shops, connected by taxiways to the hangars. A short distance from the south hangar group lies the seaplane base, protected by the bulkhead, with its own station building, two hangars, ramps and float. The grouping of the various units reduces the cost and maintenance of operations to a minimum, and increases the architectural symmetry of the entire group.

Two driveways will lead from the main highway to the airport buildings.



One of the two cantilever hangars included in the initial construction project

A two-way main driveway with parkway in the center leads direct to the administration building. The other driveway runs in an arc past the buildings, to the highway, forming entrances at both ends of the airport.

On the field side of the buildings, paralleling the east and west runways, are taxiways and parking facilities for airplanes, abutting the edge of the hangars. Between each two hangars are large paved courts 75 by 200 feet, into which the hangar doors open. This increases the hangar area, and eliminates dust and dirt from the field.

Parking facilities for 3,740 cars have been provided in close proximity to the administration building. Adjoining the main entrance to the airport are sites for a large hotel, club house, display room, shops and stores.

Across the main highway connected to the port by road and airplane ramps will be a large airplane industrial area, where airplane factories, storage buildings, assembly buildings, motor manufacturing plants, and airplane parts factories will be located.

The interior of the administration has been arranged with an eye both to utility and beauty. The approach to the main entrance is through large arched

doors of panelled Begas wood. The doors lead into a spacious waiting room, two stories high, with iron balconies extending the full length of the room on either side. For the needs and comforts of the passengers there have been designed a large attractive dining room with lunch counter, spacious lounging rooms, drug store, barber shop, and cleaning establishment. The work of operating the port has been reduced to a minimum by the centralization of all offices pertaining to the management. Outgoing and incoming customs offices and passport office are in one group; ticket office, foreign exchange office, and passenger agent in another; in close proximity, the manager's office, telephone, telegraph, and radio room. A sub-post office is located at the end of the east wing with entrances from the waiting room and the field.

The second floor is devoted to offices and quarters for various organizations. A new feature in connection with the pilots' quarters is a library and large recreation room. On this floor is also located the Department of Commerce suite.

On the third floor of the control tower, consisting of one room, are the batteries, panel boards, and other equipment neces-



Plan of the 310-acre landplane and seaplane airport being built into Lake Pontchartrain at an initial expenditure of \$2,000,000

sary to operate the radio system, public address system, and mechanism for the control of field and traffic lights. On the fourth floor is the control room, completely enclosed in glass, affording unlimited visibility in all directions, and topped by the latest approved type of airport beacon. Here are the remote controls for beacons, field lights, traffic signals, radio telephone, and master tele-type equipment.

Adjacent to the administration building, facing the field, is the maintenance and emergency building, in which ample space has been provided for any developments that may take place in the future expansion of the port. This building includes a well-equipped hospital, to which is adjoined the ambulance garage. The emergency fire fighting equipment is also quartered here. In the rear of the building is storage space for all port maintenance equipment, such as stock-rooms, tractors, plows and motorcycles.

The two hangars being built in the initial development are of the very latest and modern design. Each hangar is 120 by 200 feet and is supported on concrete piles driven into the ground upon which is placed a reinforced concrete foundation supporting the structural steel. The trusses are of cantilever type, providing an unobstructed opening 25 feet 10 inches high for the full length of the building, a type of construction that is approved by the Board of Fire Underwriters for low rate of Fire Insurance. The floors and walls are of masonry, the exterior sash are of steel. Cantilever type steel doors, mechanically operated, swing out over the court providing an additional sheltered area 25 by 200 feet. Installed in the floor of the hangar at conveniently located positions will be ground plugs for the grounding of airplanes, a new safety feature which prevents fires caused by static electricity created by men working on and around airplanes. A modern sprinkler system is also being installed in each hangar. At the rear of the hangar are shop facilities for minor repairs, lavatories and locker rooms for men and women pilots and storage space for their parachutes and flying gear.

The latest in modern equipment is to be installed in the repair building. The building itself will be of the factory-hangar type, well-ventilated and equipped for the repair of all types of aircrafts and motors. The architecture will harmonize with that of the other buildings of the airport.

The interior roads on the airport will be illuminated by standard lamp post designed to harmonize with the airport surroundings. The fountain at the entrance will be floodlighted with colors producing an unusual and beautiful spectacle upon entering the driveway. Floodlighting of the walls of the administra-

tion building from various locations on the ground and in hidden places on the walls of the building will produce a picture of the building in relief at night, emphasizing its beautiful lines. The taxiway and court area between the buildings will also be floodlighted so as to permit the operations on the ground at night with the same safety and efficiency as in the daytime.

Around the entire bulkhead, which approximates 6,500 feet, are placed boundary lights 200 feet on centers to give a definite outline of the airport at night. Placed at proper locations at the end of runways or landing strips will be green lights, denoting to the pilot the safest approach and location of the runways, and twin floodlight units which will light the entire length of the runway. These lights are placed at angles so that, regardless of the angle of the ship landing, the beam will not be reflected from the windshield to the pilot's eyes.

A new departure in marine floodlighting, which has been tried out by experiments over the past three years, will be used in lighting the seaplane landing area. The floodlights will be placed on the west side of the area used by the seaplanes in landing. The rays of the light will be controlled mechanically and adjusted to the various heights of the waves, designating to the pilot the size and direction of the waves.

At the corners and the extreme high points of each building on the port will be placed a red obstruction light. In addition the buildings near the line of approach will be floodlighted vertically and on the roof to give the pilot a perspective of this near obstruction. The top of the tower of the administration building will be equipped with a regulation

airport beacon of the three light unit type, one light of which shows a green beam, one an amber beam, and one a white beam. The beacon makes six revolutions per minute. Red obstruction lights on top of each telephone and telegraph pole will mark the entire south end of the field.

All obstruction lights, boundary lights, and approach lights will be controlled by torch clock and sun valve and by one control switch operated by remote control from the assistant manager's office. This gives the manager control of field lights at all times, and in case of emergency, all the exterior lights of the field can be operated from this office.

An illuminated wind tee on the field, easily visible to the pilot in the air, with a directional dial in the assistant manager's office, will be connected by wires to the remote control board, which, in turn, floodlights the runways indicating the wind direction.

The transformer building will house all master switches, oil switches, transformers, relays, and master switchboard, together with all lightning arresting equipment, and an emergency generator set of sufficient capacity to produce enough voltage for the entire project. This generator can be cut in instantly by remote control from the manager's office.

It is felt that this modern efficient commercial airport, so strategically located, will be to New Orleans what her seaport and railroad terminal have been—a great stimulant to trade with Mexico and South America. The Mississippi valley and the entire United States will be brought closer to world trade by New Orleans' farsightedness in building this project.

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## SHREVEPORT MUNICIPAL AIRPORT

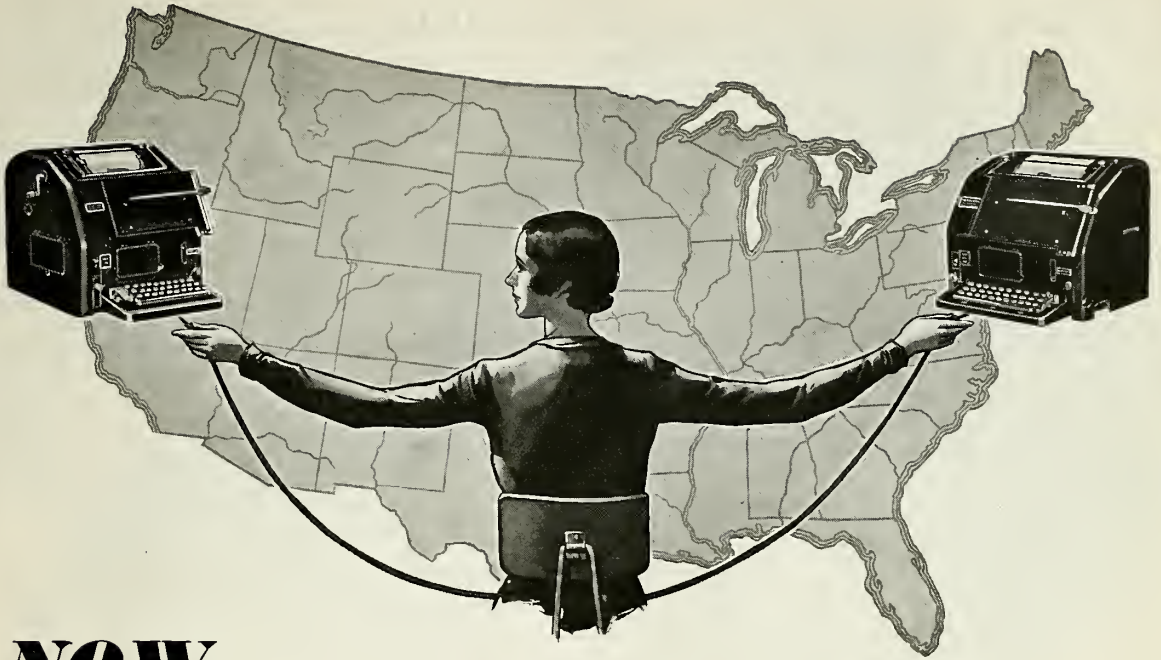
By EMILY U. MILLER

The newly completed Shreveport municipal airport, Shreveport, Louisiana, which was constructed at a total cost to the city of \$300,000, comprises an area of 346 acres. It is so situated in a bend of Red River and the neighborhood of two bayous as to make it almost free from flying hazards, a fact which will also serve as a guard against the future encroachment of builders as the city grows.

Complete lighting equipment is provided for night flying. Atop the administration building is a large revolving beacon, and on the hanger is a Morse code flash. There is also a system of floodlights. A ceiling light projector and indicator disclose the height of clouds from the ground and floodlights on the hanger indicate adjoining areas. Around the entire field, a distance of two and a half miles, are boundary lights outlining the landing area.

The administration building serves as air depot and general offices and includes a large waiting room, ticket offices, baggage rooms, concession stands, restaurant, field control room, pilots' club room and bathrooms, first aid room, rest rooms, and a room to house an emergency ambulance and fire truck. There is a roof terrace for spectators. An observation tower extends above the center to a height of 60 feet, serving as a tower for the revolving beacon. The entire building is of fireproof construction, stucco with a decorative trim in black and gold. The hangar and shop building, 100 by 115 feet, constructed along modern lines, has full width opening doors on both sides and will accommodate any type of plane. Adequate space is provided for locker rooms and storage.

The broad expanse of field enables pilots to take off in any direction.



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## CURRENT AIRPORT AND AIRWAY FACTS

### RATES ARE REDUCED FOR AIR EXPRESS

**R**ADICALLY lower air express rates representing a marked reduction from former charges, in some cases as high as fifty per cent, to 117 cities were announced recently by the Railway Express Agency, United Air Lines and four other air transport companies involved. The new tie-up between Railway Express Agency and the five airlines is the further extension of its use by shipper to and from cities and towns not located on its air routes. Close connection with the nearest airport by railway express will permit the use of the air express to expedite the movement where desired and practical. This combination of rail and air service makes every express agency a point from which shipments can be forwarded to and from the airports. The new rates become effective immediately. The air mileage of the Railway Express Agency is 10,750 miles.

While no uniform percentage of reduction is indicated, savings in cost under the new tariff are appreciable. For example, a ten-pound package moving between New York and Chicago, which formerly cost \$10 can now be shipped for \$4.40; between New York and San Francisco, for \$13.80, instead of \$26.

The air traffic of the express company is handled over the route of United Air Lines between New York and Chicago, Chicago and San Francisco, Chicago and Dallas, Salt Lake City and Seattle and between San Diego, Los Angeles, San Francisco and Seattle; the Western Air Express between Salt Lake City and Los Angeles; Cheyenne, Denver, Albuquerque and El Paso, and Pueblo and Amarillo; the Northwest Airways between Chicago and the Twin Cities, Chicago and Green Bay and other Wisconsin, Minnesota and North Dakota points; the American Airways between Chicago and Cincinnati and Cleveland and Louisville; and the National Parks Airways between Salt Lake City and Great Falls, Mont.

The new air express tariff, which goes into effect in time for the holiday traffic, creates individual rates between each of the 117 airports. The new rate scales are based on weight in one-half pound units, bulk in cubic inches, combined "length and girth" and distance moved.

The minimum rates for air express packages have also been changed, now being \$1 on shipments up to approximately 300 miles; \$1.25 on those up to 1,500 miles and \$1.50 on packages shipped 1,500 miles and over. Roughly speaking all of the rates are based on the air travel per pound for each 100 miles, the

basis being made slightly lower the longer the journey.

### Airlines Only Form of Transportation Showing Increase During 1931

**A**IR transport is the only form of transportation that has shown a gain in 1931 over 1930, according to a release of the Aeronautical Chamber of Commerce.

Air transport showed an increase of 6.5 per cent during the first nine months. Trans-Atlantic steamship lines in the first eight months carried eastbound 18.8 per cent fewer passengers than in the previous year, and westbound 43.96 per cent.

Class I railroads in the United States lost 20.5 per cent of its passenger traffic during the first seven months of the year.

### American Airways Offers Prizes For Name For Transcontinental Service

**A** PRIZE of \$250 and a free round-trip from coast to coast has been offered by American Airways, Inc., for a name and a slogan for its New York-Los Angeles forty-eight hour passenger service.

All American Airways agents, numbering 7,000, are eligible. The name must not exceed four words. The slogan must not exceed ten words.

Other prizes offered are: second prize, \$100 and a 1,000-mile round-trip journey over American Airways System; third prize, \$50 and a 500-mile trip; five fourth prizes, \$10; ten prizes, \$5.

### Air Ferry, Discontinuing Service, Announces Traffic Total of 3,805 Passengers

**T**HE Air Ferry service operated by the Curtiss-Wright Flying Service between three major metropolitan airports, including Glenn H. Curtiss Airport, North Beach, Queens; Newark Airport, Newark, N. J.; and Floyd Bennett Airport in Brooklyn, has suspended operations until spring. Week-end operations, however, will continue in good weather.

Since the beginning of operations, the Air Ferry service, over its fifty-five mile tour, has flown 3,805 passengers between the airports. The planes on this unique service have traveled 34,607 miles, a total of 402 hours of flying time over the triangular course. The pilots are Harry Hublitz, Robert Galloway and Roland Rohlfis.

### Lambert-St. Louis Airport Is Given First A-T-A Rating

**L**AMBERT-ST. LOUIS Municipal Airport at St. Louis has been granted an A-T-A rating by the United States Department of Commerce, and is the first airport in the country to receive this designation, which is the highest ever bestowed by the government. In many

of the requirements, the airport surpassed the specifications by wide margins.

The "T" rating is the highest dealing with size of effective landing area that the Department of Commerce at present gives. Only those airports can receive it which have an effective landing area of at least 3,500 feet with clear approaches and a field in good condition for landing at all times, or have landing strips meeting Department of Commerce requirements.

### Pal-Waukee Airport Sells Four Planes During Month of November

**T**HE Pal-Waukee Airport, Inc., during the month of November sold four airplanes: a Stearman Junior Speedmail to Wayne King of Chicago; a Stinson Junior to Warren Corning of Winnetka, Illinois; a Monocoupe to John Porter of Chicago; and a Super-Wasp Bellanca to the Monroe Chemical Company of Quincy, Illinois.

### United Air Lines Opens Two New Stations in Radio-Telephone System

United Air Lines has just put on the air the thirtieth and thirty-first stations in the private radio-telephone network which it operates over its transcontinental airlines. The newly installed Western Electric transmitting and receiving units are located at Wichita, Kansas, and at Fresno, California.

The same transport system continues its program of equipping its planes for radio-telephone communication. It has just ordered eleven long wave receivers of the Western Electric type to equip planes for picking up Department of Commerce radio beacon signals and weather broadcasts.

### Substantial Progress Seen in Development of U. S. Air Transport

**P**ROGRESS of a most gratifying character was made by air transport operations in the United States during the past fiscal year, according to the annual report of Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

In comparing conditions at the end of the fiscal years 1931 and 1930, the report states that 37,132 more miles were being flown daily by air transport companies both in the United States and on foreign extensions at the end of the past fiscal year than at the end of the previous period.

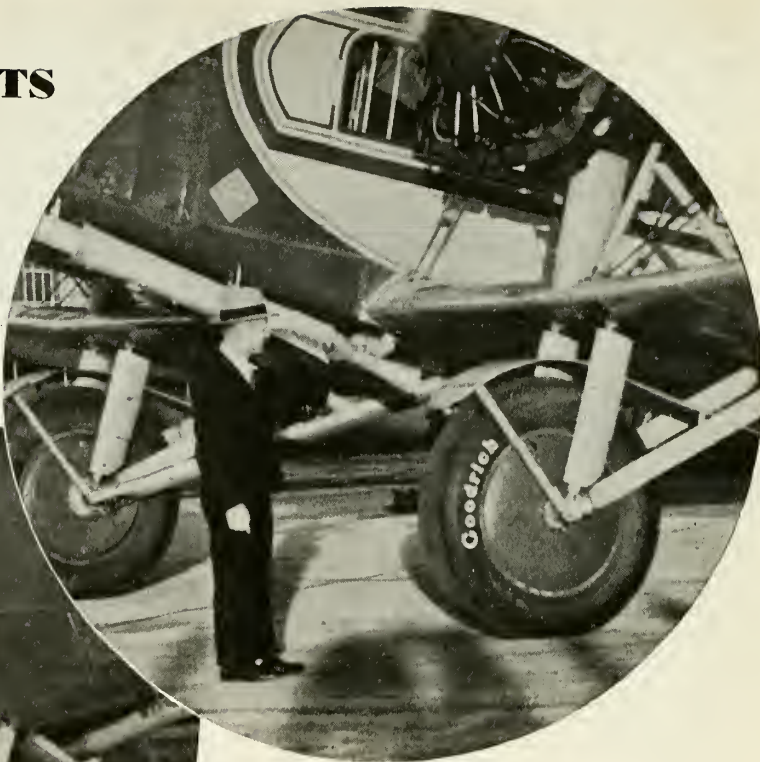
The total mileage flown on schedule every 24 hours in the United States, and to Canada, the West Indies and Latin America at the end of the fiscal year 1931 was 140,314, according to the report. During the calendar year 1930, a total of 417,505 passengers was carried and nearly 37,000,000 miles were flown.

Outstanding in the work accomplished by the Aeronautics Branch during the past fiscal year has been the expansion of  
(Continued on following page)



**FOR  
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**OR  
FAST  
MAIL PLANES**



The big Boeing tri-motor transport plane pictured above weighs eight and three-quarter tons. It s 54 x 12 Goodyear Airplane Tires are built to withstand a landing impact of 43 tons!

To the left is one of the speedy Goodrich-equipped mail planes that round out the nation-wide service of United.



**The Nation's Largest Air Line chooses Goodrich**

"Goodrich Airplane Tires in use on planes of United Air Lines have given a splendid account of themselves," writes Mr. D. B. Colyer, Vice-President of Operations, Boeing Division.

"On United Air Lines' coast-to-coast route planes encounter temperatures ranging from sub-zero to semi-tropical. Landings and take-offs are made from airports at sea level to 7,800 feet. In fact, nearly all operating conditions found in the country are met on this route.

"Because United Air Lines is an air mail as well as passenger transport operator, maintaining a twenty-eight hour

schedule from the Pacific to the Atlantic Coast, this exacting service demands that it purchase only the best quality products.

"This letter is an acknowledgment of the excellent performance of your Goodrich Airplane Tires."

Goodrich Low Pressure Airplane Tires are the first choice of airmen the world

over. A set of them can be easily and quickly installed on your plane, whether it is equipped with or without brakes.

Phone your nearest Goodrich dealer or write to the Tire Division of the Aeronautical Department, The B. F. Goodrich Rubber Company, (Est. 1870), Akron, Ohio, or Los Angeles, California.

**QUICK FACTS ABOUT UNITED AIR LINES**

United planes cover over 32,000 miles a day. United has had more than 35 million miles of flying experience. United handles 50.7% of the nation's air mail . . . United runs up 34.6% of the total mileage made by the thirty-four leading air lines . . . more than half of United transcontinental flying is done at night . . . less than 6% of this schedule has been retarded on account of weather conditions, etc., during the past year.

**Goodrich Airplane Tires**

Another B. F. Goodrich Product



Over 40 rubber articles for airplanes • Silvertown Tires • Tail Wheels • Hose Tubing • Engine Mounts • Crash Pads • Accessories

(Continued from page 48)

the Federal airways system which, when completed, will embrace 25,000 miles of airways fully equipped with aids to air navigation for the safe operation of aircraft both day and night. At the end of the last fiscal year there were 17,500 miles of airways lighted and under construction which were, or were to be, equipped with radio direction and communication facilities and weather reporting services. Considerable research work was also undertaken by the Department as a part of its 1931 program.

#### American Airways Opens New Service

**A** NEW service to Cincinnati and Louisville, Ky., was inaugurated Nov. 25 by American Airways, affording direct air travel between New York and the Ohio valley cities. The additional schedule added to the Cleveland-Louisville run, Embry-Riddle Division, leaves Cleveland at 4:30 p.m. and arrives at Louisville at 7:28 p.m. Central Time. It will be possible to leave Newark Airport at 12:15 p.m. via United Airlines, make a quick connection at Cleveland and reach Louisville in time for dinner.

#### First Steam-Heated Airplane is Operated by American Airways

The first steam-heated airplane in the country will be on the new scheduled run between Louisville and Cleveland, officials of American Airways have announced.

The steamheating apparatus is remarkably small, weighing, liquid and all, but 32 pounds. It consists of a tiny boiler, similar to those used on larger heating plants, but instead of radiating heat from fluted radiators in the cabin, fresh air is heated on two small radiators and fed into the cabin.

Exhaust flames are used to heat the boiler, which is placed in a small pipe which forms an elbow off the exhaust pipe. The boiler contains Prestone, of which five and a half quarts are used in the entire system. Since the boiling point of Prestone is 315 degrees, the operating temperature of the boiler is 340 degrees. There is an automatic thermostat which regulates the amount of exhaust that goes into the flues of the boiler.

#### Department Issues Bulletins Affecting Airports and Aircraft Operators

**T**HE Department of Commerce, Aeronautics Branch, has recently issued two bulletins of interest to air transport. Bulletin No. 5 lists the airports and landing fields, tabulated by states, which were in existence on October 15, 1931.

Bulletin No. 7-C contains the Department of Commerce Regulations governing entry and clearance of aircraft, which went into effect on April 7, 1931, and United States airport of entry regulations, effective November 1, 1931.

#### Chicago Tribune Installs Devices for Wind Recording

**E**LECTRICALLY operated wind direction and velocity instruments recently installed by the Chicago Tribune are proving a source of unending interest to Tribune Tower visitors.

Equipment located on top of Tribune Tower controls recording devices in a brass panel in the lobby wall. In the panel are two twenty-four-inch dials with indicators giving the wind velocity and direction at a glance. An anemograph, directly underneath the dials, records the wind velocity and direction for the preceding 24 hours.

The equipment on top of the Tower consists of a wind vane and air pressure gauge and an anemometer, which measures the velocity of the wind.

Another weather service recently inaugurated by the Chicago Tribune is a large air current chart, also located in the lobby of Tribune Tower.

#### Realigned Wilmington-New York Airway Section Placed in Operation

**T**HE relocated beacon lights on the newly aligned Wilmington (Del.) New York Section of the Atlanta-New York airway have been placed in operation and the airway is now ready for use.

The lighting on this section is furnished by ten beacons located at the following points: Pedricktown and Paulsboro, N. J., Croydton, Pa., Riverton, N. J., Morrisville, Pa., Clarksville, Monmouth Junction, New Brunswick, Metuchen and Linden, N. J.

The beacon lights which are spaced at approximately ten-mile intervals from Wilmington to New York are of the 36-inch rotating type with a candlepower of 1,250,000, the newest design in use on the airways. They replace the 24-inch beacons formerly used on that section. Each of the 36-inch beacons is double ended, showing a clear light at both ends, revolving three times a minute and flashing a light six times a minute. Two course lights are to be installed on a platform above each beacon, to point backward and forward along the airway.

#### Brownsville Airport To Be Equipped With Radio-Telephone

**A**MERICAN Airways has ordered radio-telephone apparatus to equip its landing field at Brownsville, Texas, southernmost point in its transcontinental airlines.

Scheduled for immediate installation, the unit at Brownsville will make the thirtieth two-way radio-telephone station in the private network operated over this transport system.

The equipment will be of the Western Electric type used at the other twenty-nine stations as well as in the transport planes flying these lines. It will consist of a 400-Watt short wave radio trans-

mitter, a short wave receiver and auxiliary apparatus.

#### Ford Airport Extends Hard-Surfaced Runways to 3,200 and 4,200 Feet

**A**TOTAL of 1,500 feet has been added to the length of the runways at Ford Airport, Dearborn, Michigan, it is announced by the Ford Motor Company, Airplane Division. Improvement projects completed during the past summer increased the total length of the two runways to 7,400 feet.

The length of No. 1 runway, running from the airport passenger terminal near Dearborn Inn in a northeasterly direction toward the dirigible mooring mast, was increased 500 feet, making its length 3,200 feet.

The length of No. 2 runway, which runs northwesterly and southeasterly, was increased 1,000 feet, making its total length 4,200 feet.

The runways are of concrete 75 feet wide. Both have turning areas at each end. A large turning area is located at the southwesterly end of No. 1 runway, at the passenger terminal, to enable planes to load and discharge passengers at the terminal gate.

The increased length of the runways greatly facilitate landing and taking off from the airport and enable planes to attain a relatively high altitude before leaving the airport area and passing over adjacent buildings.

#### Colonial Carries 4,218 Passengers During First Year of Operation

A total of 4,218 passengers to and from Hartford was carried by American Airways, Colonial Division, during its first year of Hartford passenger operation which ended on December 1.

Traffic has shown a steady monthly increase starting with 111 passengers in the month of December, 1930, and reaching a peak of 580 passengers in and out of Hartford last July.

Five Ford trimotors daily are operated in each direction.

#### Embry-Riddle Installs Beacons on Texarkana-Dallas Route

**T**EMPORARY beacons have been placed on housetops, barns, office buildings and other structures between Texarkana and Dallas on the Embry-Riddle Division of American Airways.

These will be removed when the Department of Commerce installs permanent lights on the line next year. In the meantime American Airways has placed nine emergency lights, visible at a distance of seventy-five miles under ordinary flying conditions. No night flying is scheduled on this route at the present time, but on the late afternoon trip, especially during thick weather, lights have been found helpful to navigation over the 150-mile run.

(Continued on following page)

# LOOKING FORWARD

The General Aviation Manufacturing Corporation enters 1932 with all its great resources pledged to the development of new and advanced types of aircraft.

To this goal it is devoting all the skill and enterprise for which the engineers and designers of this company have long been noted . . . all the experience gained in over a decade of fine aircraft building . . . all the modern manufacturing facilities of the great Curtiss-Caproni plant at Baltimore, now the home of General Aviation Manufacturing Corporation.

To this unique union of ability, experience and facilities, add the reputation for exceptional performance and dependability which G. A. M. C. ships have always enjoyed, and you will understand why it is being persistently rumored among the airwise: "*Good things are happening at Baltimore.*"

## GENERAL AVIATION MANUFACTURING CORPORATION

*Division of General Aviation Corporation*

P. O. Address: Dundalk, Baltimore, Maryland

New York Sales Office: 1775 Broadway

(Continued from preceding page)

Post Office Announces Extension On Transcontinental Route

ANNOUNCEMENT was made recently by Postmaster General Brown that, effective January 16, 1932, an extension of the air mail service over the transcontinental route between Chicago, Illinois and San Francisco, California so as to operate from Omaha, Nebraska via Sioux City, Iowa and Sioux Falls, South Dakota to Watertown, South Dakota, will become operative. The extension will be 259 miles in length.

This extension was authorized last June 30, but has been temporarily held up.

The tentative schedule provides for departure of the air mail plane from Omaha at about 8 a.m. and arrival at Watertown at about 10:30 a.m. The

tentative schedule southbound provides for the departure from Watertown at 2:30 p.m. and arrival at Omaha at about 5 p.m., in time for connections with the transcontinental schedules both east and westbound at this point.

The operator of the route will provide planes for the accommodation of passengers as well as mail in order to build up the passenger carrying business in this territory.

11,692 Passengers In Four Years Over Cincinnati-Chicago Route

AIR mail between Cincinnati, Indianapolis and Chicago was four years old December 17.

In that four years 275,970 pounds of mail have been carried, 11,692 passengers have ridden the line, and approximately 1,487,337 miles have been flown by American Airways, operators of the route.

\$95,540 Spent In Three Years On Bowman Field

THE Louisville & Jefferson County Airboard in a recent report showed that it had spent \$95,540 in the last three years on improvements to Bowman Field, Louisville, Kentucky, and during the first ten months of 1931, a total of \$4,064, as against an income of \$5,045 for that period.

Many improvements are planned by the board when and as funds are available. Great improvements have already been made on the field during the past few years.

Following purchase of the old metal hangars from the Government, which is erecting a new plant, the old hangars were moved down to the southeast corner of the field, repaired and painted, and have been leased to Curtiss-Wright, which concern has become overcrowded in its present hangar.

American Airways has leased space, with an agreement that it will erect its own hangar within five years. In the meantime it is using space in Curtiss hangars.

Concrete taxi strips, or loading aprons have materially reduced dust about the hangars and administration building. The old shacks which formerly dotted the edges of the field have been removed and there has been considerable sodding, fencing, and road making.

The landing field itself is high, dry, quick draining, and not in need of concrete landing or taking off strips.

United Air Lines Carried 2,205 Tons of Mail In Eleven Months

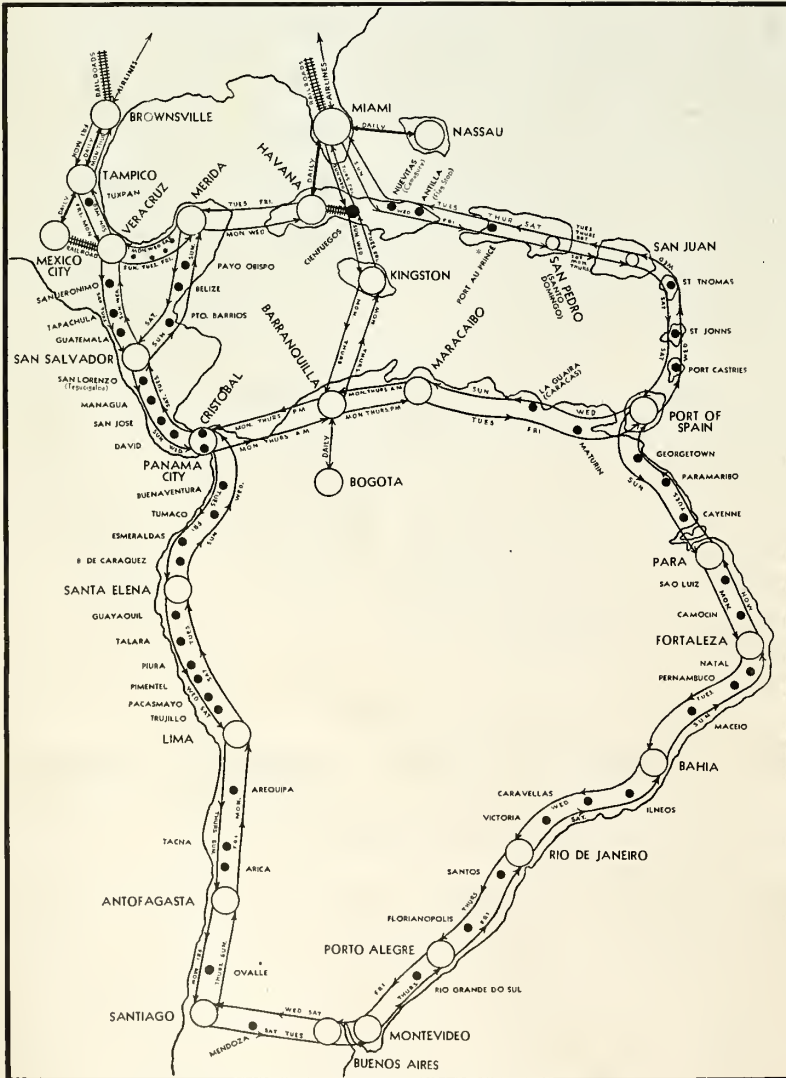
UNITED AIR LINES carried 2,205 tons of mail the first eleven months of this year on its transcontinental, middle west, southwest, inter-mountain and Pacific coast routes, a compilation issued recently shows for its subsidiary companies—Boeing, National and Pacific

Department of Commerce Issues Two New Airway Bulletins

The Department of Commerce, Aeronautics Branch, has issued two bulletins to supersede the loose-leaf Airway Bulletins formerly published.

Airway Bulletin No. 1, "General Airway Information," contains basic and current information pertaining to the aids to air navigation on the Federal airways system and other data of interest to airmen and aircraft operators. The booklet contains 184 pages.

Airway Bulletin No. 2, a bulletin of 169 pages entitled "Descriptions of Airports and Landing Fields in the United States," embodies accurate and current information on all airports and landing fields of record with the Aeronautics Branch. Both publications will be revised from time to time.



Map showing route and schedule of the Pan American Airways

# BELLANCA BUILT THE AIRBUS



## to give YOU greater profits

Airline competition is making it more and more evident that airplane performance cannot be distorted in any given direction without costly sacrifices. It is now generally recognized that the airplane most needed today must possess a CORRECT BALANCE OF FACTORS. Speed, safety, and profitably large payload—these are beneficial to the operator *only when perfectly combined*, as they are combined in the Bellanca AIRBUS, a fast 15-place single-engined cabin plane.

Discussing the AIRBUS design, G. M. Bellanca recently said, "The highly efficient single-engined type of monoplane or sesquiplane has proved itself capable of CUTTING IN HALF the operating costs of an airline running multi-engined designs, or similarly capable of DOUBLING THE OPERATING CAPACITY at no increase of equipment or maintenance costs."

#### TO INTERESTED AIRLINE OPERATORS:

Complete specifications and operating costs for the AIRBUS, on request. This is a fast, roomy, 15-place single-engined plane built primarily to increase the airline operator's profits, though readily adaptable to other fields of service. The Bellanca Air Cruiser, of similar type, has a beautifully-appointed 9-place cabin, equipped with lavatory and buffet.



The Bellanca Skyrocket—6-Place Cabin Plane

**BELLANCA AIRCRAFT CORPORATION**  
New Castle, Delaware

Chrysler Building, New York

Bellanca Aircraft of Canada, Ltd., Montreal

# BELLANCA

# ALUMINUM and its alloys IN AIRCRAFT

T. W. BOSSERT

*Assistant Metallurgist, Aluminum Company of America*

IN every form of transportation a significant transition has occurred with its development. In water transportation, for example, all ships and boats, large or small, were of wood construction before the days of the Civil War. Today wooden ships are still sailing the seas, it is true, but they are relatively few and small, while ships constructed of metal transport the world's goods and form the world's navies. In rail transportation, cars were constructed with wood superstructures. In the past few years there has been a rapid change from wood to steel construction, and just lately railway car manufacturers are substituting aluminum and its alloys for steel because of the large saving in weight realized thereby.

As in water and rail transportation, a transition has been and is taking place in the aircraft industry. In the early pioneering days of the heavier-than-air craft, the entire structure of the plane consisted of wood and fabric covering. Today a large majority of planes have a metal fuselage, an increasing number of manufacturers are abandoning wood for metal wing construction, and the same trend towards the use of metal is evident in covering material for fuselage and wing.

Rigid lighter-than-air craft have always had metal frame construction, with rubber-coated fabric containers for the gas. Even in this field pioneer efforts are being made toward employing very thin metal sheets, riveted together to form a gas-tight metal envelope, which not only serves as the gas holder but also forms part of the structure of the ship.

There are many reasons for the change pictured above. Important among these are the points relating to material supply, dimensions and form, as well as flexibility of application, all of which favor metal as compared with wood, but in the present stage of the aircraft industry these are not as important as are the factors safety, dependability, uniformity of material, durability and physical properties which are also in favor of metal. In the aircraft industry, therefore, metal is being regarded with constantly increasing favor as a material for fuselage and wing construction and covering. Its place in the construction of power units and their accessories is obvious.

The two metals which find particular application in aircraft structures are steel and aluminum. Were it not for the science of electrochemistry, the widespread use of aluminum, with its many advantages, would probably be unknown, for it is by an electrochemical process that this metal is produced. The light weight of aluminum,

roughly one-third that of steel, and the development of high strength alloys, similarly light but with the strength of structural steel, together bring it into favor in this field.

These high strength alloys are given their superior properties by heat treatment. They are of two types, namely, (1) those which, after heat treatment must be reheated to about 150° C. for a period of time in order to develop their maximum properties, and (2) those which age or harden spontaneously at room temperature after heat treatment. Alloys of the first group, that is, those which must be reheated at 150° C. after heat treatment, are the aluminum-copper-manganese-silicon alloy (25ST), and the aluminum-magnesium-silicon alloy (51ST).

The alloy 25ST, after the above ageing treatment, has a tensile strength similar to that of mild steel, namely from 55,000 to 60,000 pounds per square inch (4,218 kgs. per square centimeter), a yield point of 30,000 to 35,000 pounds per square inch (2,109 to 2,460 kgs. per square centimeter) and an elongation of about 18 per cent. It is widely used for the production of forgings for aircraft. One of the best examples of aluminum alloy forgings is the 25S propeller blade. Its virtues are many when compared with the wooden type. The metal propeller is extremely durable; it is not affected by changes in weather conditions; it is not scored or cut by deep grass, which is an extremely important fact in cross-country air travel; and in a crash it will bend but not break. A bent propeller can also be straightened and used again with assurance that its life has not been appreciably shortened.

The alloy 51ST does not attain the strength found in 25ST but because of its excellent workability it finds many applications where the highest strength is not the important requirement. The crankcase on a well-known radial engine is a 51ST forging.

The best known of the strong aluminum alloys is the one popularly termed "duralumin" or "dural" and termed by one producer, 17ST; it belongs to the second class mentioned above. This alloy contains, besides iron and silicon, copper and magnesium as principal constituents, as well as a small amount of manganese. The alloy is relatively soft and workable immediately after heat treatment, but hardens or ages during the four days following quenching, so that it attains about the same tensile properties as does 25ST.

This alloy is the one used the most for aircraft structures. In the fully aged con-

dition its workability is superior to that of 25ST. Furthermore, since the workability of the alloy immediately after heating and quenching is considerably above that of the aged material, many manufacturers take advantage of this fact in difficult forming operations.

The question naturally arises as to why aluminum alloys are employed when there are available very high strength alloy steels which would compare favorably with these alloys on the weight-strength basis. Such steels are used to a great extent in fuselage construction, but there are many cases where aluminum has been employed with a saving in weight. The answer lies in the fact that section thicknesses employed in aircraft are very light, because of the necessity for weight saving, and that steel sections would have to be so thin, in order to compete with aluminum alloys on the weight-strength basis, that the resulting structure, although being as strong as that made of aluminum, might, however, be flimsy. That is, it would not resist permanent deformation by suddenly applied local stresses.

A survey of the aircraft industry shows, first of all, that military ships are predominantly of metal construction, and that the proportion of aluminum used to other materials is continually increasing. In one large bombing plane the wing structure, control surfaces and fuselage, except for the engine mounting, are made of aluminum alloy tubing and sections built up of aluminum alloy sheet. The covering for fuselage and wing is fabric. All control members are aluminum alloy castings or forgings. A large number of other planes are constructed with aluminum alloy fuselage or wing structure, and with the control surfaces covered with aluminum alloy sheet. Gasoline and oil tanks are made from unalloyed aluminum, where strength is not the primary requirement.

In the commercial field, mention is made of two types of larger planes, one a 14-passenger trimotor type, which are constructed almost entirely of aluminum alloy. Not only are the fuselage and wing structures aluminum alloy, but in addition the material covering these structures is corrugated sheet of Alclad 17ST, a material developed in the laboratories of the Aluminum Company of America. In one of the types mentioned above, the entire structure, except for tubing members, is made of Alclad 17ST. The outer surface of the Alclad covering is not painted or protected in any manner, because of the remarkable resistance of the new Alclad alloy sheet to atmospheric attack.

Alclad metal is of particular interest be-

cause of its make-up, and also because of its corrosion resisting characteristics. It is a composite sheet whose strong alloy core is covered on either side with a sheath of pure aluminum. The coating is completely alloyed with the core at the surface of contact as evidenced by the fact that the constituents of the strong alloy core actually diffuse into the high purity coating. Were it not for the electrolytic refining process by which pure aluminum is produced, the availability of the high purity metal or coating material would be greatly limited.

Alclad metal is of further interest because its most remarkable characteristic is electrochemical in nature. A coating of pure aluminum is considerably more resistant to corrosion than are the strong aluminum alloys, and for this reason the alloy core would be protected by the pure aluminum coating, just as would be the case with a paint coating. In addition, however, exposed portions of the core are also protected, because the high purity aluminum is electro-negative to the alloy core. It has been found that exposed areas one inch (25 mm.) in diameter are effectively protected against corrosion in this manner.

In the field of castings, aluminum alloys are finding wide application. In this class also heat-treated castings are available.

They have a strength considerably greater than that of most other aluminum casting alloys, and have ductility and shock resistance far superior to such alloys as No. 12 (8 per cent copper, 92 per cent aluminum), No. 43 (5 per cent silicon, 95 per cent aluminum), etc. Castings of these heat-treated alloys are employed to a large extent in aircraft engines; in fact, were it not for the aluminum alloys, the very low weight horsepower ratio obtainable in aircraft engines would not be possible.

The weight of aluminum used in aircraft engines amounts to 50 to 60 per cent of the total engine weight, depending on the type of engine; that is, whether it is air or water-cooled. In the water-cooled engine the following parts are generally of aluminum alloy; cylinder block, cylinder heads, crankcase, oil pan, gear housings and pistons.

The aluminum alloy piston deserves special mention because of its universal use in aircraft engines. The lightness and high heat conductivity of the aluminum alloy piston are important factors in reducing vibration and increasing the efficiency in the internal combustion engine.

In lighter-than-air craft the accepted material for rigid airship construction is the duralumin type wrought alloy. Among the well-known ships having this construction

are the *Los Angeles*, *Graf Zeppelin*, and the *Akron*. The Navy's small airship Z-MC-2, constructed by the Detroit Aircraft Corporation, has a structure of wrought metal alloy, and is covered with thin sheets of Alclad metal, approximately .010 inch (0.25 mm.) thick.

These sheets are riveted together, the joints are sealed, and the envelope thus formed serves as the container for the helium gas. None of the conventional gas bags found in other rigid dirigibles are employed in this new development. The function of the metal sheathing is twofold. It serves not only as the gas container, but also forms part of the structure of the ship, thus taking some of the stresses imposed in flight, which would normally have to be absorbed by the internal beams, etc.

Aluminum bronze powder has wide application where protection against sunlight, moisture, and salt water plays a part in the aircraft industry. Aluminum pigmented paints are widely used as protective coatings for metal in those cases where corrosion is to be avoided, especially where the structure is also exposed to sunlight.

*Paper presented at the 56th General Meeting of the American Electrochemical Society, Pittsburgh, Pa.*

## DEVIOMETER FOR AIR COURSES NOT ON REGULAR RADIO BEACON BEAM PATH

THE Aeronautics Branch of the Department of Commerce has been working on the development of an auxiliary device known as a "deviometer" for use in conjunction with radio range beacon equipment to enable airmen to take advantage of the radio beacon signals even when they are flying courses at variance with the ones set by the radio beams.

Providing the pilot with the means of flying courses at variance with the one set by the radio range beacons, the deviometer not only will increase the usefulness of these beacons, but will also add a further factor of safety to flying in thick weather by assisting planes in keeping to the right of the regular beacon path, thus avoiding the possibility of a collision with planes coming from the opposite direction.

To use the deviometer, the airman need only set his instrument for the course desired, provided this course is not more than fifteen degrees from the regular beacon course on either side, and then fly as if he were following the beam in the normal fashion.

The deviometer is used in connection with the visual radio beacon receiver. Using this equipment with the deviometer, a pilot desiring to fly over a route between two airports, one of which has a radio range beacon but the other lying, say, ten degrees to the left of the radio-served airway, would adjust

the deviometer so that equal reed deflections are obtained along a line ten degrees to the left of the true beacon course, and thereby lay out a new beacon course which he may use.

Another use suggested for the deviometer is its aid to a pilot who has departed from the true course in order to avoid a storm area or for other reasons, since the instrument may be set to indicate a direct course to the next beacon without getting back on the original beacon course.

It has been further suggested that the deviometer may serve as a position finder and thus be useful to aircraft not flying a beacon course. A pilot can tune in a radio range beacon station and adjust the deviometer which then gives him his bearing with respect to the equisignal course marked out by the beacon. Repeating this operation with another range beacon station gives a second bearing, and from the two a definite fix of the position of the aircraft is readily obtained.

Tests have indicated that the deviometer may be advantageously employed to obtain new course up to fifteen degrees on either side of the equisignal zone. Beyond these limits, the useful distance range of the beacon is reduced. A second limitation of the deviometer is the fact that the space characteristics of all radio range beacons are not

identical. This is particularly true of radio beacons, the courses of which have been adjusted to fit several airways converging at arbitrary angles upon a given airport. However, when employed with these limitations in mind, considerable flexibility is added to the use of a radio range beacon normally giving but four beacon courses.

The deviometer is essentially a device for changing the relative sensitivity of the two reeds of the vibrating reed indicator, thereby permitting the pilot to fly courses (with equal reed deflections) along a line other than the equisignal line or zone set up by the beacon. In its simplest form, the deviometer consists of a resistor shunted across the coils actuating one of the two reeds, thereby reducing the driving current through the actuating coils and consequently the sensitivity of that reed. The course, as determined by equality of reed deflections, is therefore shifted from the equisignal zone in the direction of the shunted reed.

In its more advanced form, the deviometer consists of a rheostat connected to the reed driving coils. A movement of the pointer to the right or left reduces the shunting resistance across one or the other pair of reed driving coils and shifts the course obtained to the right or left of the equisignal zone set up by the beacon. The scale over which the pointer moves may be calibrated in such a manner that the reading will be correct for all beacons having similar space characteristics.





# GATTY'S NAVIGATION INSTRUMENT

TO those who fly out of sight of land or surface craft in a landplane, the important aim is to arrive at a specific objective. On the successful accomplishment of these objectives may, in time of peace, depend the physical safety of personnel, or, in time of war, the success of a military mission of importance. But to do this, the aviator must know precisely his speed through the air and his exact course of flight. A satisfactory solution of this problem has been indicated by the Post and Gatty flight around the world last June. The unusual accuracy in travel from point to point displayed in this flight amazed the most capable navigators.

The accompanying photograph, made especially for AERO DIGEST, is probably the first published of the instrument developed by Gatty especially for this flight and by means of which he solved his principal problem in aerial navigation. Gatty's point of observation in the plane was about ten feet aft of the pilot. His sole mission was to navigate, for which purpose he employed all the accepted navigational methods except radio.

From this new drift and ground speed indicator, the ground speed of an airplane may be continually determined by a synchronization with the movement of the earth's surface of a transparent moving film. On this flight, observations were taken over the ocean (without using smoke bombs or whitecaps on the water for observation points), over land, and in two instances over a layer of fog.

Explanation of the method of using the instrument appears in the book 'Around the World in Eight Days,' by Post and Gatty, and is given here by permission of the publishers, Rand, McNally & Company; other information is reproduced from a recent "News Letter" of the Navy Department.

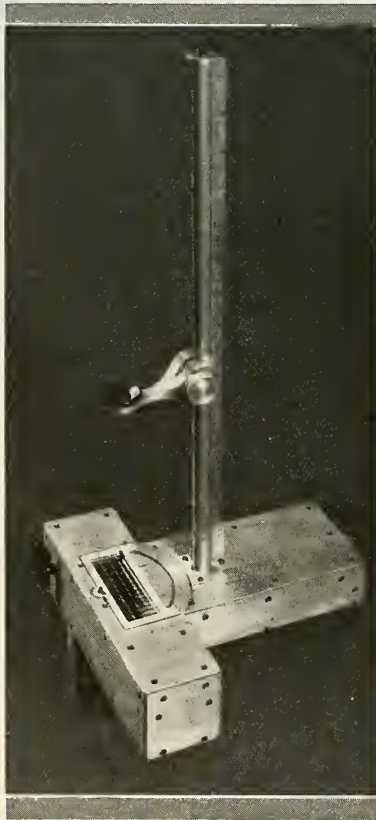
Gatty's drift and speed indicator somewhat resembles a microscope set above a mechanism similar to the outlet of a motion picture projector. The eyepiece can be moved closer to or farther from the spectrum through which a film moves at a predetermined constant speed which

is actuated and governed by clockwork. The whole mechanism is encased in sheet duralumin, is compact and light in weight. The accompanying diagrams illustrate the periscope arrangement for sighting the ground through the film.

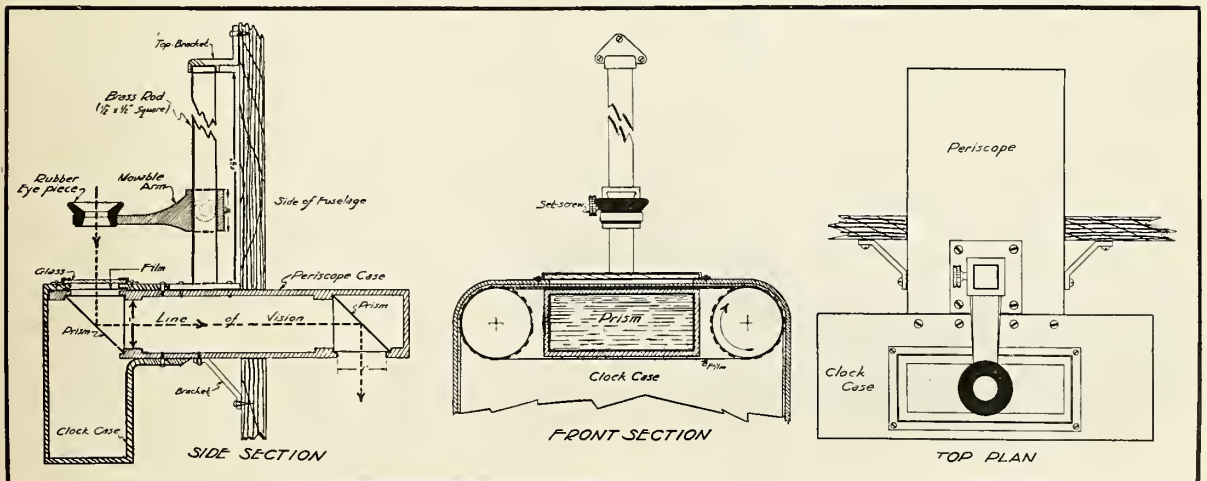
Only one known factor is required, namely, the altitude above the object or surface sighted. The procedure for using the instrument is as follows: Estimation is made of the altitude or by flying down, setting the altimeter and flying upward again, the exact altitude from a spot on the earth is determined. The eyepiece is focused on the spot and the clockwork started. There will be a difference in the apparent speed of the film (on which lines are marked in red) and the rate at which the spot passes across the spectrum, so the eyepiece is raised or lowered until both speeds apparently are equal. A table previously prepared to accompany the instrument shows the ground speed corresponding to the two known factors of the observation—the distance of the eyepiece from the film, and the altitude of the instrument from the object sighted.

For determining drift, the operation is simultaneous with that for calculating speed. In its normal position the center line of the spectrum on the instrument runs along the longitudinal axis of the plane. If there is any difference in direction from the line of flight in relation to the ground, that is, if the plane is blown by a cross wind and is "crabbing" along, the object sighted will not move along the center line. The indicator is then turned until the motion of the ground is parallel with that line. At the end of the observation the number of degrees which the instrument had to be turned from the true axis of the plane indicates the angle of drift.

(Continued on following page)



Details of Gatty's instrument



(Continued from preceding page)

In addition to this special drift and ground speed indicator and as example of the completeness of the preparations for this flight the following navigation equipment was carried in the *Winnie Mae* during the flight around the world: two aperiodic compasses; MacKenzie type deviation card; speed-time-distance table from Weems' "Air Navigation"; ten specially made mercator charts; HO charts and British War Department maps; Sperry Gyro Horizon and Directional Gyro; Bureau of Standards model C sextant; Waltham second-setting navigational watches (one rated to sidereal and one civil time); two Longine second-setting navigational watches similarly set; Line-of-position book; star altitude curves with special template designed by Gatty and covering necessary information from the Nautical Almanac; small drafting machine and chart board.

Celestial observations were taken about every half hour across the Atlantic except for a period of four hours when it was necessary to fly blind. The star altitude curves were used at night with much success. Only one to three shots were taken at any one time, and Gatty estimated that he was never more than twenty-five miles from his course. Mr. Gatty plans improvements in the physical make-up of the instrument which will make it even simpler, lighter and adaptable to all types of airplanes.

## TWO-PLACE AUTOGIROS WITH CABINS

THE first cabin autogiro to be manufactured in the United States has been announced by the Kellett Aircraft Corporation of Philadelphia. The cabin has been developed to afford comfort-



(Acme photo)

The new cabin autogiro built in England. It has three rotor blades

able winter flying and protection from noise and wind. For flying in warm weather the cabin enclosure may be removed to convert the ship into a conventional open model.

The cabin is made easily accessible by a door which opens up a portion of the roof on the right side. To the left of the pilot a large window is provided, with a catch to hold it open in flight. Good ventilation is supplied in the cabin even with the window closed.

The Kellett cabin provides comfortable accommodations for two people seated side by side. A space has been provided back of the seat for small packages, in addition to the large baggage compartment which is standard in all Kellett autogiros.

The open model of the Kellett autogiro, from which the cabin job was developed, was described in detail in the July issue of *AERO DIGEST*. Two distinctive features of the Kellett design are a larger fixed wing than ordinarily used and a unique rotor pylon, in which a large diameter front member carries all of the starting and braking torque and most of the lift but no side load. Control of the rotors is through two inter-

locking levers in the left of the cockpit, one of which controls the rotor clutch and the other the rotor brake.

The Kellett autogiro is powered with a seven-cylinder Continental Model A-70 engine of 165 horsepower.

THE De Havilland Aircraft Company of England has built for the Cierva Autogiro Company a two-seater cabin model known as the C.24, which, while conforming in all essential features to the Cierva principles, differs in appearance from previous models. Several new developments that have been worked out by the American and British autogiro companies are also incorporated. The ship is powered with an inverted De Havilland Gipsy III engine of 120 horsepower.

Chief among the new features are the elimination of interconnecting bracing cables on the rotors, the use of a three-bladed rotor system, and the application of a mechanical starter driven by the engine for starting the rotors.

The cabin, besides offering the advantages of a closed plane, is used to streamline the pylon supporting the rotor. It is built up in a pyramid form to the mounting of the rotors, and slopes downward at the back to a high fuselage that reduces its slant, giving a well-streamlined form. Another interesting feature is the addition of two fixed fins at the ends of the tailplane.

The rotor blades are full cantilever beams, the downward droop being limited by stops on the rotor head rather than by shock cords as formerly.

Starting is effected, not by deflecting the propeller slipstream on to the rotor, but by means of a starter driven by the engine through a clutch mechanism, as has been used so successfully in the United States.

A wheel under the nose prevents nosing over and keeps the machine in flying position while at rest on the ground.



The new American Kellett autogiro with removable cabin enclosure for winter flying

# DYLE-BACALAN D. B. 70

By PAUL E. LAMARCHE

**T**HE Société Aérienne Borderlaise, which until recently has been known as the Société Anonyme des Traxaux Dyle et Bacalan, has constructed a twenty-eight-passenger transport plane in its Bordeaux plant; the ship was put through trial flights at the Champ d'Aviation de Mérignac. This firm, which was founded in 1879 as an important naval dockyard, has constructed aircraft since 1925. Its plant is divided into two principal sections, one of which is used for construction of parts and the servicing of Bréguet military planes and the building of duralumin flying boat hulls, and the other which is devoted to the construction of the Dyle and Bacalan airplanes.

The D.B. 70, as the transport plane is known, follows the principles used in the constructions of all Dyle and Bacalan models in that it has a wide central body providing lift surfaces. In this forward fuselage section are accommodated the passengers and crew and to it are attached the wings, the engine mountings, the two aft fuselage sections and the landing gear.

As with all Dyle and Bacalan models, the new D.B. 70 is principally of duralumin, a special high resistance steel being used in the frames. Its design follows that of the D.B. 10, a bi-motor night bomber which this firm built several years ago.

The main body section is very thick and has a biconvex profile, to which are attached the two wing sections. This section forms a part of the cabin and has a frame made up of four principal steel longerons which are parallel to the span and braced by duralumin cross pieces. The cross section is built up of a series of frames, the two extreme frames being located in the faces of the aft fuselages and crossed by Vees. These are attached to the longerons, as are the vertical members and cross pieces.

The wing, which is attached to the upper edges of the center section by steel fittings, has the same chord over all of their span and has a three-degree dihedral. It is rigidly braced on both sides by two oblique braces which have cross pieces and diagonals to give added strength. These oblique braces extend from the mid-section of the outer wing to the lower longerons on either side of the forward fuselage section. The wings are built up with two principal spars which are crossed by a number of duralumin ribs, and are covered with duralumin sheet.

The two aft fuselage sections, which are joined to the wide fuselage section, are built up of four longerons placed at equal distances on the four sides and braced by cross pieces and vertical frames and, as with the wings, covered with duralumin sheet. The tails of these two fuselage sections are joined by the horizontal empennage which, because of the distance between them, allows exceptionally long horizontal surfaces. The horizontal surfaces consist of a long stabilizer, which can be regulated in flight and an elevator which is compensated. There are two compensated rudders, one at the end of each fuselage, with fins. All elements of the empennage are of metal construction, the frames being of duralumin tube and the covering of duralumin sheet.

The landing gear, which has an exceptionally wide track, is composed of two elements suspended from the two extremities of the main fuselage section. Each unit has two wheels and consists of a longitudinal Vee which is braced by an arm reaching to the lower part of the fuselage. The two units are equipped with oleo-pneumatic shock absorbers, and the wheels, with brakes.

The ship is powered with three 600-horsepower geared Hispano-Suiza engines which give the plane a total of 1,800 horsepower.

A fire wall, and a second wall designed to reduce the sound, separate the passenger cabins from the engines. A passage inside allows inspection of the engines at all times when the plane is in flight and at the same time permits easy communication between the pilots and the mechanic. Fuel sufficient for five and a half hours of flight at cruising speed is carried in two wing tanks placed at a distance from the motors.

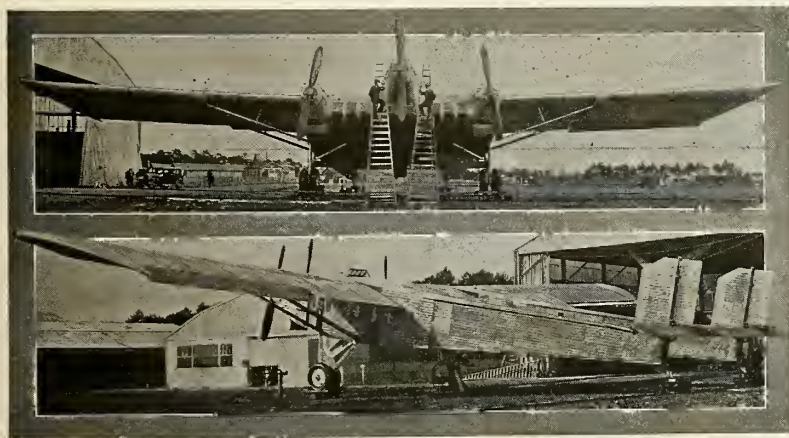
The pilots occupy an open cockpit placed over the after section of the center engine mounting where there is a side-by-side seating arrangement and dual control equipment. Visibility from this position is good in all direction, and the pilots can communicate with other members of the crew during flight. A wireless sending and receiving set, as well as all necessary instruments for night flying, is carried.

Accommodation for twenty-eight passengers is divided between the two aft fuselage sections and the center forward section in which is the salon. The two aft fuselages each accommodate ten passengers by day; the salon has seats for eight, as well as two tables for the convenience of the passengers. Behind the salon on one side is a small kitchen, and on the other side is a lavatory. The forward part of the salon contains a promenade extending across the interior and parallel to the small corridor inside the leading edge used by the crew. The total volume of the two fuselage cabins and the salon in the main section is 2,048 cubic feet. Each of the aft fuselage cabins measures 5.9 feet in width and 17.5 feet in length. The plane was constructed so as to be able to accommodate passengers on night as well as day flights and the seats can readily be converted into berths, making a double deck arrangement in the two aft fuselages which for night flying can comfortably accommodate eight. The salon also can accommodate the same number, making the total of passengers on night flights twenty-four. Normally in daytime the fuselage cabins have two rows of seats with a central passageway between them. There are a number of windows both in the leading edge of the forward fuselage section and the lateral faces of the aft fuselages which allow plenty of light.

For access to the cabins there are three entrances, the principal of which is by a trap arrangement in the bottom of the after part of the forward fuselage section which gives access by use of a small ladder.

### Specifications

Span .....	120 feet
Length .....	65 feet 6 inches
Height .....	19 feet 6 inches
Total lifting surfaces ..	2,345.68 square feet
Weight empty .....	16,758 pounds
Weight of fuel .....	4,410 pounds
Payload .....	6,835.5 pounds
Total weight .....	28,665 pounds
High speed .....	125 miles per hour
Cruising speed (at 3,280 feet) ..	112 m.p.h.
Ceiling .....	14,800 feet



The French three-engined type D.B. 70 Dyle and Bacalan 28-passenger transport

# DIGEST OF FOREIGN TECHNICAL ARTICLES

## GIANT PLANE CONSTRUCTION

Structural Problems in the Construction of Giant Airplanes (Problemi strutturali nella costruzione degli aeroplani giganti), E. Trigona della Floresta. *L'Aerotecnica*, Vol. 11, No. 8, August, 1931, pp. 971-991, 18 figs.

THE author begins with an examination of the various constructive tendencies in the design of large airplanes, and in particular the tendency which he sees aims at the developments of higher load ratios in the increase of dimensions, and that which aims at an increased wing loading. He explains the importance of studying structures with minimum weight and maximum rigidity, citing several researches on this subject, among them those of General Crocco. He discusses metal construction and indicates the ratio of structural weight for carbon-steel, nickel-steel, chrome-molybdenum steel and duralumin parts.

He illustrates with photographs certain structural features of the Dornier, Junkers and Rohrbach planes and shows the favorable load conditions for which an Italian airplane, constructed on the basis of the researches quoted, is designed.

## FRENCH COLONIAL AVIATION

The National Congress of Colonial Aviation. (*Les Congrès national d'aéronautique coloniale*), A. Lesage. *Genie Civil*, Vol. 99, Nos. 17 and 18, October 24 and 31, 1931, pp. 424-426 and 452-455.

SUBJECTS covered at the National Congress of Colonial Aviation in Paris October 5 to 10, are discussed. Questions regarding the organization and government of French colonial air transport lines are dealt with in the first installment, while the technical side of colonial aviation is reviewed in the second. The author points out that for the first time the attention of manufacturers of aeronautic equipment was directed towards the special requirements for supplies to be used in the colonies, and quotes the regulations made concerning airplanes, seaplanes, engines, fuels, and materials (with special attention to corrosion). Sport flying, photography, police and forest patrols, and the use of ambulance airplanes in the colonies were also considered.

## Elsa Gardner

### SUPERCHARGERS

The Turbo-Compressor and the Supercharging of Aero Engines, F. O. P. Whittle. *Royal Aeronautical Society Journal*, Vol. 35, No. 251, November, 1931, pp. 1047-1074, 17 figs., 6 tables.

THE theory and problems peculiar to supercharging by means of the turbo-compressor are discussed, and the lines of development which compressor design should follow are indicated with special reference to supercharger control. The author considers that next to the exhaust-turbine-driven type an auxiliary engine for the supercharger appears to be the most satisfactory method of drive and control, provided the practical difficulties are not too great. Another method, better than the single gear ratio, is a two- or three-speed gear and gear-changing mechanism. The adiabatic efficiency of the compressor has a very pronounced effect on the permissible degree of supercharging with uncooled types, and on the degree of inter-cooling necessary with types where inter-coolers are fitted.

The brake thermal efficiency of the unsupercharged engine at heights is increased by supercharging without inter-cooling, and may be either increased or decreased by inter-cooling. The restriction to a maximum boost pressure used on modern types of supercharged engines is believed to be unsatisfactory and should be replaced by restrictions on the r.p.m. and induction density.

### STATIC LIFT OF AIRSHIPS

The Influence of Atmospheric Humidity and Other Factors upon the Static Lift of Airships, W. G. Bird. *Royal Aeronautical Society Journal*, Vol. 35, No. 251, November, 1931, pp. 973-1039, 18 figs.

THE results are given of an investigation undertaken by the writer to determine the effects of humidity of the atmosphere and other secondary factors upon the static lift of airships. The research was made to clear up the reason for the discrepancy between the designed lift and apparent value deduced from a lift

and trim trial. There was a strong suspicion that in fabric-covered ships, the hygroscopic nature of the outer cover and gas bags might be an influence, the absorption of moisture causing an increase in the weight of the latter cover over and above that allowed for in design. Various representative samples of fabric were prepared and exposed for long periods to conditions of temperature and humidity which simulated those to which the fabric would be subjected in practice.

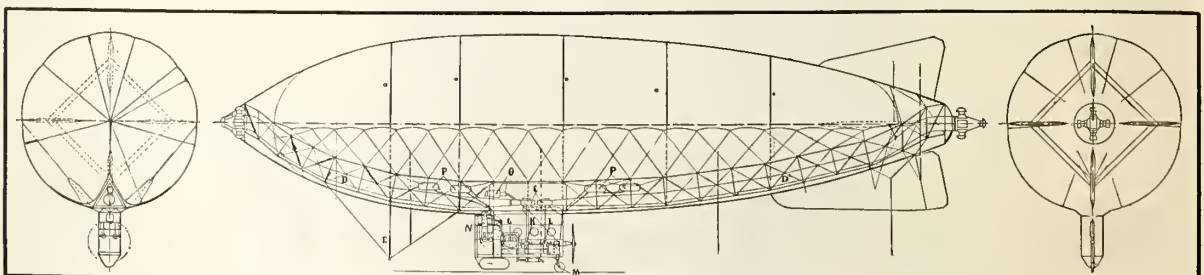
The theory of existing lift formulas is examined in order to check numerically the error involved in any hypothesis. Accurate equations (applicable by a simple change of constants to either hydrogen or helium as lifting agent) are deduced in a form suitable for computation by logarithms or slide rule.

### ITALIAN AIRSHIPS

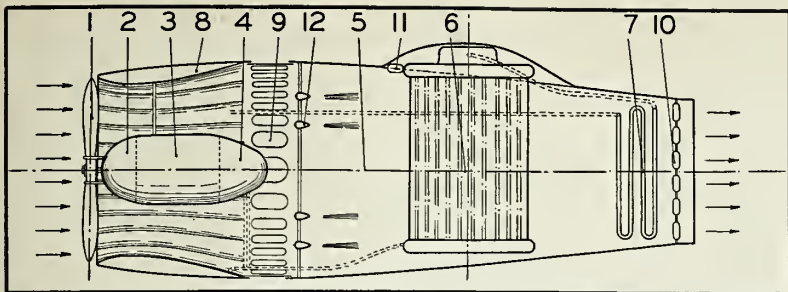
The Latest Italian Airship (*L'Ultimo dirigibile Italiano*), A. Silvestri. *Rivista Aeronautica*, Vol. 7, No. 9, September, 1931, pp. 478-484, 5 figs.

THE latest Italian airship OMNIA DIR, designed by E. Forlanini for experiments with a new type of control system, is described in detail. The airship is of the semi-rigid type and of small dimensions suited to the experimental purposes. It has a volume of 4100 cu. m. of gas, a length of 56 m. and is 13 m. in diameter at its largest cross-section. It is driven by a 160-hp. Isotta Fraschini engine. Its beams are of duralumin tubing, while the joints and tail-surface structure are of Elektron.

The principle of motion by reaction has been adopted for the control, and a group of nozzles are located in the prow and stern of the ship. The nozzles are designed for propulsion and are regulated by special valves controlled from the car. They may be turned in three directions, between the orthogonals, to obtain thrust above and below and in lateral and longitudinal directions. The compressed air is led to the nozzles by two cloth hose as indicated in the illustration. A new method for mooring the airship is also described.



The newest Italian airship Omnia Dir—C—ventilator; D & D'—two cloth hose; G—motor; H & I—couplings; M—wheel can be withdrawn into the car during flight; N—ventilator; P—ballast sacks. (Illustration from *Rivista Aeronautica*)



Steam turbine equipment for navigation in the stratosphere. 1—tractor; 2—reduction gear; 3—turbine; 4—pump group; 5—furnace; 6—boiler; 7—superheater; 8—condenser; 9—partial cold-air inlets; 10—partial gas outlets; 11—heat regulator controlled by pilot; 12—nozzles for naphtha. (Illustration from Rivista Aeronautica)

**STEAM TURBINE FOR STRATOSPHERIC NAVIGATION**

Steam Engine Equipment for Navigation of the Stratosphere (Apparati motori a vapore per la navigazione stratosferica), G. A. I. Raffaelli. Rivista Aeronautica, Vol. 7, No. 9, September, 1931, pp. 411-416, 5 figs.

THE author examines the operation of an internal-combustion engine at high altitudes and concludes that the useful power for such a motor is considerably diminished as the airplane approaches the stratospheric zone. He illustrates with graphs the amounts of useful power developed by an internal-combustion engine with the ordinary as well as ideal types of superchargers, and by a steam turbine at various altitudes up to 20,000, indicating that in the case of the turbine, the useful power increased somewhat at high altitudes, while the useful power of the internal-combustion engine decreased to zero at 20,000 meters. He points out other advantages and possibilities of a steam turbine for this field of navigation and gives the layout of a steam-turbine equipment which uses naphtha as fuel and weighs complete about 4 kg. per horsepower.

**AIRCRAFT RANGE AT ALTITUDES**

The Range of Aircraft at Heights as Affected by the Use of Altitude Control. Flight Tests on an Aircraft with an Air-Cooled Radial Engine. A. E. Woodward Nutt, A. F. Scrogges, and E. Pinn. (British) Aeronautical Research Committee—Reports and Memoranda No. 1399 (Ac. 520), November, 1930, 8 pp., 16 figs.

IN the experiments discussed, the fuel consumption of a DeHavilland Stag aircraft, fitted with a Jupiter VI engine, was measured at a series of speeds in level flight at four heights with the maximum amount of altitude control without a fall in r.p.m., as well as with sufficient altitude control to cause a fall in r.p.m. of about 3 per cent, and with the amount of altitude control limited by stops fitted by the engine makers. The greatest maximum at all heights for this aircraft was obtained by the use of sufficient altitude control to cause a fall in the r.p.m. of about 3 per cent, the maximum range then appearing to remain constant with height.

With the maximum amount of altitude control possible without a fall in r.p.m., the maximum ranges were lower throughout, and there was a slight increase in maximum

range with height. With the amount of altitude control limited by the stops, as in ordinary service use of the aircraft, the ranges at all heights were considerably lowered, and the maximum range appeared to decrease with height.

**DURALUMIN HEAT TREATMENT**

Influence of Variations in Heat Treatment and Ageing on Duralumin, A. Von Zeerleder. Engineering, Vol. 132, No. 3428, September 25, 1931, pp. 418-419, 6 figs.

THE author discusses the results of experiments carried out with Avional D, which is made by the Aluminium Industrie, A. G. Neuhausen, Switzerland, for aircraft purposes. He considers that, as there is little difference in the composition of Avional and duralumin, the results of the tests are applicable to the latter. It was found that raising the temperature of the quenching medium and the temperature of ageing to 50° Cent. had no considerable influence on either the mechanical or corrosion-resistant properties. Ageing at low temperatures (0° Cent.) only delayed the ageing, while at higher temperatures (50° Cent.) it was accelerated.

The author shows that the percentage increases in elongation obtained on ageing at 50° Cent., in comparison with that obtained at 0° Cent., is an advantage, and considers it surprising that ageing at 50° Cent. caused neither deterioration of the corrosion properties, nor changes of potential which occurred, however, when ageing was carried out at 145° Cent.

Paper presented before the Institute of Metals.

**HEAVY-OIL ENGINES**

Injection, Ignition, and Combustion in High-Speed Heavy-Oil Engines, S. J. Davies and E. Giffen. Royal Aeronautical Society Journal, Vol. 35, No. 250, October, 1931, pp. 928-951, and (discussion), 951-970, 25 figs.

THE present state of knowledge in the development of heavy-oil engines is reviewed. It is shown that a short ignition lag and a satisfactory rate of pressure rise may be attained by speeding up the chemical reactions prior to ignition, and that engine design may secure this desired effect by facilitating the transfer of heat from air to fuel. Evidence is submitted to demonstrate that the composition of the fuel itself has an important bearing on the behavior in the

engine, which leads to the conclusion that the speed of chemical reaction is affected.

The authors suggest an investigation of ignition lag and how it is influenced by the rate of fuel injection (that is, by the fuel pumps, nozzles and systems), by the regulated movement of the air, by the cylinder design, and by the various fuels. They also recommend that fuels and their physical characteristics be investigated to obtain data of a nature similar to those concerning gasoline-engine fuels, made available by the work of Ricardo, Tizard, Pye, and others.

**TORSIONAL RIGIDITY OF AIRPLANE STRUCTURES**

The Torsional Rigidity and Torsional Strength of Airplane Structural Parts (Die Verdrehsteifigkeit und Verdrehfestigkeit von Flugzeugbauteilen), H. Hertel. Luftfahrtforschung, Vol. 9, No. 1, August, 1931, pp. 1-56, 134 figs.

THE object of the reported investigation was to determine the torsional rigidity as well as the elastic axis of airplane structural parts. The test pieces were made from materials preferred for airplanes, including plywood and duralumin, and had the cross-sections frequently used in airplane structures, such as box with thick and thin walls, tubes with and without intermediate walls, as well as tubes with perforated walls.

From the torsion tests, numerical values were given for the shearing modulus of plywood in a uniform climate. It was found also that the influence of climate on the shear modulus of plywood was very great and that the deformation in a warm moist climate depended on the duration of the load. The torsion test on a two-spar covered wing proved that these wings can be regarded as torsion tubes with partially impeded cross-sectional camber. In connection with the torsion tests carried up to fracture, the reduction of rigidity with load, the breaking process, the fracture shapes and their causes are described.

Report of the Deutschen Versuchsanstalt fuer Luftfahrt.

**TURBINE WING**

Experiments with a Propeller in a Tube (Esperienze con eliche intubate), L. Stina. L'Aerotecnica, Vol. 11, No. 8, August, 1931, pp. 923-953, 25 figs.

EXPERIMENTS are discussed which were made in connection with the turbine wing described in a previous article and abstracted and illustrated in the July issue of AERO DIGEST. The experiments were carried out in the wind tunnel of the Air Ministry with propellers in tubes at a fixed point and in the wind.

It was found that the propeller in the presence of a Venturi-type fuselage had a greater efficiency than the isolated propeller. The propeller joined with the Venturi-type fuselage had an efficiency superior to that of the isolated propeller and of the propeller in the presence of the same fuselage. When the propeller is operating, the Venturi-type fuselage does not resist, but offers a thrust (reaction) that contributes to increase the propeller thrust.

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### LANDING SPEED CALCULATION

Calculation of the Landing Speed of an Airplane from the Aerodynamic Characteristic and Vertical Speed at Landing (Calcul de la vitesse d'atterrissage d'un avion à partir de ses caractéristiques aérodynamiques et de la vitesse verticale à l'atterrissage). R. Pouté. L'Aéronautique, Vol. 13, No. 150, November, 1931, pp. 385-386, 3 figs.

THE author develops a method for determining the horizontal velocity of an airplane at the moment that the point of contact is made with the ground, without wind and without aerobatic maneuvering. He derives equations for calculating the height at which it is best to reduce the power so that the propeller has zero thrust, and illustrates the influence of fineness and minimum velocity for lift. In referring to the efficiency of aerodynamic brakes, he considers the extra lift devices much more effective.

### AIRPLANE ENGINES

Recent Engine Groups (Groupes-moteurs récents). L'Aéronautique, Vol. 13, No. 150, November, 1931, pp. 393-399, 35 figs.

THE principal characteristics of recently developed engines are given with illustrations of some of their most interesting features. These include the Model B 3-cylinder 40-hp. and the Model A 7-cylinder 100-hp. engines of the Société Française de Fabrication Aéronautique, centrifugal supercharger of the 750-hp. Renault, Potez radio generators, the 720-hp. heavy-oil Junkers Juno IV, the Argus A.S. 8 80-hp. and A.S. 10 220-hp. inverted engines, the Menasco 160-hp. Buccaneer (American), the Walter 700-hp. Atlas, the Vega, Venus, and Mars, the S.A. 20 500-hp. Siemens-Halske, the 75-hp. Pobjoy, the 340-hp. Armstrong-Siddeley Double Mongoose, and the 575-hp. Bristol Mercury engines.

### WING PROFILES

Criteria for the Choice of Wing Profiles (Sui criteri di scelta dei profili alari). A. Eula. L'Aerotecnia, Vol. 11, No. 9, September, 1931, pp. 1069-1090, 18 figs.

THE factors influencing the choice of wing profile are examined, covering thickness, maximum lift, minimum drag, maximum efficiency, coefficient of speed range, coefficient of climb, and value of moment at the angle of zero lift, and the compromise required are pointed out. The influence of the geometric characteristics of the profile upon the selection factors is discussed, and the evidence is given showing the importance of the moment value particularly for the monoplane.

It is demonstrated that the symmetrical or bi-convex profiles with slight camber might be best, aerodynamically and constructively, although they were found to possess poor maximum lift in model tests. In the author's opinion, the care to select wings of great lift is not justified since devices have been developed to free the maximum lift from the wing-section form. Reference is made to the results of variable-density wind-tunnel tests which indicated a decrease in lift for cambered and thick wings but

a remarkable increase of maximum lift for symmetrical and bi-convex wing sections. The conclusion is reached that, especially for monoplanes, the wing section of the future will be symmetrical or bi-convex.

### PROPELLER HUB

A Spring Hub for Aero Engines. Aircraft Engineering, Vol. 3, No. 33, November, 1931, pp. 279-280, 4 figs.

A propeller hub is described which emulates a spring drive and a vibration damper, having been developed by C. B. Carter in the course of torsional-vibra-

tion investigations at the Royal Aircraft Establishment. The hub as well as damping out torque variation, also forms a transmission dynamometer. The spring element comprises a number of radial arms integral with the part that is secured to the engine shaft, the drive being transmitted through these to the propeller, which is mounted on bearings so as to be capable of a small angular movement relative to the shaft. Between the tips of the spring arms and the driven member, trunnion bearings are provided which are submerged in grease.

## CAIRNS MODEL A MONOPLANE

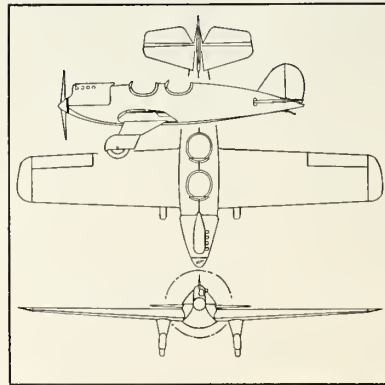
FLIGHT tests of the Cairns Model A monoplane are being made with various power plants installed, according to reports recently issued by officials of Cairns Aircraft, Naugatuck, Conn.

Flights have been made in this ship with a four-cylinder, in-line ninety-horsepower engine installed. This powerplant is a Naugatuck product, designated by the Cairns company as the "G" engine. A maximum straightaway speed of 140 miles per hour and a landing speed below forty miles per hour were reported at-

tained with the 90-horsepower "G" engine.

The Cairns Model A is an all-metal, two-place, tandem open-cockpit, low-wing monoplane in which are incorporated several new features of design and construction. In the process of development during the past few years the company has cooperated with the Navy Department in the study of the construction details of this ship. Complete data on structure and performance is being withheld for official announcement.

The Naval Aircraft Factory Physical Laboratory has completed elaborate tests on the Cairns monocoque fuselage. Such high strength factors were found that a power plant of double the original horsepower can be installed. It is expected that three planes will be in commission by January.



Outlines of the Cairns metal monoplane

### Specifications

Span.....	36 feet, 6 inches
Length overall.....	24 feet, 7.5 inches
Wing area.....	161.2 square feet
Aileron area.....	14.5 square feet
Stabilizer area.....	17 square feet
Chord.....	5 feet, 11 inches
Tail span.....	10 feet, 7 inches
Elevator area.....	12 square feet
Fin area.....	6 square feet
Rudder area.....	7.75 square feet
Angle of fuselage with ground.....	12 degrees
Tread.....	7 feet, 6 inches



Cairns 90-horsepower model A monoplane with an all metal stressed skin

# RECENT AERO PATENTS

**T**HE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N.W., Washington, D.C., at the rate of 20c each. State patent number and inventor's name when ordering.

Automatic airplane control. George De Beeson, Huntington Park, Calif. (1,829,790).

Wing for aircraft. Edmund B. Cairns, New York, N. Y., assignor to Cairns Development Co., Wilmington, Del. (1,829,922).

Hydraulically operated variable pitch airscrew. Henry S. Hele-Shaw and Thomas E. Beacham, London, England. (1,829,930).

Airplane. Joseph B. Strauss, Chicago, Ill. (1,830,007).

Airplane. Edward H. Davis, Cincinnati, Ohio. (1,830,019).

Aerial safety belt. Edward L. Hoffman, Dayton, Ohio. (1,830,059).

Aircraft variable pitch propeller and blade mounting. Guy Evoritt, Princeton, Mo. (1,830,101.)

Airplane wing slot control. Lessirer C. Milburn, Wickliffe, Ohio, assignor to Glenn L. Martin Co., Cleveland, Ohio (1,830,122).

Landing carriage for aircraft. William S. Glennan, Norfolk, Va. (1,830,228).

Aircraft control system. Samuel J. Elsbey, Jr., New Albany, Ind. (1,830,429).

Safety aeroplane. Louis Madarasi, East Youngstown, Ohio. (1,830,436).

Airplane hangar door. David Greenwald, New York, N. Y. (1,830,653).

Airscrew hub. Hamilton N. Wylie, Coventry, England, assignor to W. G. Armstrong Whitworth, Limited, same place (1,830,731).

Automatic adjusting mechanism for aircraft propellers. Lorin W. Schoepp and Forrest S. McMann, Chicago, Ill. (1,830,858).

Airplane. Jacob P. Krastel, Wilmington, Del. (1,830,878).

Airplane landing gear. Harold A. Hicks, Detroit, Mich., assignor to Ford Motor Co., Dearborn, Mich. (1,830,901).

Airplane. Clem H. Congdon, Doylestown, Pa. (1,830,931).

Airplane landing field. Harry C. Belleville, Oakland, Calif. (1,830,978).

Wing pin fitting. Harold E. Fox, Pittsburgh, Pa., assignor to General Aviation Corp., New York, N. Y. (1,830,991.)

Aircraft including differential aileron control system. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,831,039).

Aircraft liner. Frederick A. Berg, Chicago, Ill. (1,831,055).

Steering gear for airships. George W. Paulson, Ore., assignor to Steering Gear Mfg. Co., same place (1,831,134).

Shock absorbing device for airplanes. Whiteman Reed, San Francisco, Calif. (1,831,136).

Flying machine. William Roberts, Naugatuck, Conn. (1,831,139).

Braking appliance for airplane. Edward N. Cavert, Chicago, Ill. (1,831,160).

Airplane. Joseph M. Fells, Pasadena, Tex. (7,831,166).

Airplane. Jacob Hojinowski, Nekoosa, Wis. (1,831,175).

Airplane. Thorne Sonsteness, Pontiac, Mich. (1,831,203).

Air valve for aerofoils. Samuel E. Hitt, Elyria, Ohio (1,831,247).

Airplane. Philip Masi and Clinton A. Schrmaling, Port Chester, N. Y. (1,831,253).

Variable pitch propeller. Stanley Borchardt, Wauwatosa, Wis. (1,831,284).

Aeronautical propeller and method of making. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co., same place (1,831,365).

Tandem aeronautical propeller. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co., same place (1,831,366).

Propeller. John Squiers, Detroit, Mich. (1,831,373).

Aeronautical propeller. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co., same place (1,831,394).

Gyroscope flying machine with oscillating wings. Joseph de Korwin, Brussels, Belgium, assignor to Korwin Flyer Co., Chicago, Ill. (1,831,655).

Airplane propeller. William F. Triplett, Grand Junction, Colo. (1,831,692).

Aerofoil for aeroplanes. John Sharp, Cleveland, Ohio (1,831,780).

Apparatus for training student pilots of aircraft. Henry J. White, New York, N. Y. (1,831,939).

Aeronautical propeller, Adolph F. Euchenhofer, Dayton, Ohio (1,831,949).

Parachute. Charles Broadwick, San Francisco, Calif. (1,832,180).

Airplane. Ninko Spanovic, Duquesne, Pa. (1,832,254).

Aeronautical propeller. Rex B. Beisel, East Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,832,275).

Airfoil construction. Harold E. McGuire, Shelby, Ohio (1,832,314).

Crank case oil seal. Arthur Nutt, Kenmore, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,832,320).

Adjustable and reversible propeller. Stanley P. Thomas, Mercer, Calif. (1,832,335).

Aircraft. Edward B. Wilford, Meroin, Pa. (1,832,338).

Aircraft. Frank A. Howard, Elizabeth, N. J., assignor to Standard Oil Development Co., (1,832,396).

Balancing system for aircraft. John P. Tarbox, Philadelphia (1,832,433).

Airplane launching device. Matti Nierni, Seattle, Wash. ((1,832,499).

Airscrew. Christian Lorenzen, Berlin, Germany, assignor to Bendix Aviation Corp., Chicago, Ill. (1,832,783).

Airship. Edward L. Reynolds, Tulsa, Okla. (1,832,790).

Airplane tire. Joseph A. Faucher, Detroit, Mich., and Earle P. Halliburton, Tulsa, Okla., assignors to Morgan & Wright, Inc. (1,833,019).

Aeroship. Carlos Ortega, New York, N. Y. (1,833,033).

Variable pitch propeller. Albert F. Thomes, Jacksonville, Fla. (1,833,059).

Aircraft propulsion. William H. French, Toronto, Ont., Canada (1,833,110).

Ski for air planes. Francis J. Ditter, Minneapolis, Minn. (1,833,210).

Airplane. Maurice O'Connor, Oakland, Calif. (1,833,258).

Air vehicle aeroplane. Vezino de Vezino, San Francisco, Calif. (1,833,280).

Gas control for aircraft. Max B. Pupp, Souderton, Pa. (1,833,336).

Aircraft. Charles W. Crooke, Jr., Jacksonville, Fla. (1,833,416).

Landing gear for airplanes. Joseph Miyo, Perth Amboy, N. J. (1,833,468).

Apparatus for use in connection with photograph aerial surveys. Arthur C. W. Aldis, Birmingham, England (1,833,548).

Airplane. Thomas D. Ward, New Albany, Ind. (1,833,600).

Control surface operating mechanism for aircraft. Ralph D. Carlton and Hubert F. Franklin, Hempstead, N. Y., assignors to Curtiss Aeroplane & Motor Co. (1,833,635).

Emergency flotation gear for aircraft. Charles F. Hathorn, Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,833,646).

Airplane construction. Alexander Kartvelichvili and Edmond Chagniard, New York, N. Y., assignors to Chagnkart International Aviation Corp., same place (1,833,649).

Structure of wings for aircraft. Barnes N. Wallis, Weybridge, England (1,833,696).

Airship propulsion. Prokop J. Prokop, Brooklyn, N. Y. (1,833,722).

Propeller blade. Robert L. A. Leparmier, Paris, France (1,833,843).

Aeronautical propeller. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co., same place (1,833,911).

Aircraft, including windows for same. Igor Sikorsky, College Point, N. Y., assignor to Sikorsky Aviation Corp. (1,833,917).

Airplane blind flying instrument board. Verdon O. Levick, Toronto, Ont., Canada, assignor to De Havilland Aircraft of Canada, Ltd., same place (1,833,970).

Aircraft wing construction. Otto H. Jensen, Utica, N. Y., assignor to Bossert Corp., same place. (1,833,995).

Airplane. Hans E. Perlain, Portland, Ore. (1,834,135).

Means for decelerating aircraft. Robert H. Goddard, Worcester, Mass. (1,834,149).

Apparatus for landing and housing dirigibles. Charles W. Purnell, Natchez, Miss. (1,834,220).

Aircraft. Arthur A. Reid, Dickson, Pa. (1,834,254).

Airplane propeller. Rudolph W. Schroeder, Glenview, Ill. (1,834,351).

# NEW EQUIPMENT AND METHODS

## CRANKSHAFT LAPPING MACHINE

A NEW crankshaft lapping machine is now offered by Norton Company for lapping simultaneously the pins and bearings of automotive crankshafts. The shaft to be lapped is rotated between a live headstock and a floating footstock center. The lapping arms, one of which is required for each pin and bearing, are equipped with telescoping reels, each of which carries a roll of abrasive paper. Each time a lapping arm is removed from a pin or bearing these reels are indexed automatically, thus presenting a fresh, unused abrasive surface to each pin and bearing lapped.

By means of a reciprocation mechanism in the headstock the shaft is caused to move back and forth in the direction of its axis. This materially improves the finish and eliminates all grinding wheel marks.

Lapping lubricant is pumped to each arm by a pump which, with its driving motor is a complete unit supplied as part of the machine equipment. The motor is wired for 110 volts, alternating current and can be connected to a light circuit. Motors of other voltages are available.

The machine will swing 16" diameter over the table and will accommodate a maximum length of 48". Crankshaft pins and bearings up to 2½" in diameter by 4½" long, can be lapped. The machine complete weighs 4800 pounds and requires a floor space approximately 56x104". Motor driven or belt driven models are offered.

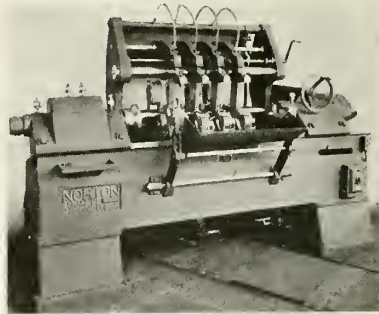
## PORTER CUTTING TOOL

A NEW tool devised to cut heavy bolts and rods, split nuts, etc., is made by H. K. Porter, Inc., of Everett, Mass. This tool, called the "Compact", measures 7½" in length; it easily cuts bolts up to ¾" in the thread, round stock up to 5/16" diameter, wedges off nuts up to 5/16" and in the end model splits bolts up to 11/16" in diameter. The "Compact" consists of a cutting head with the jaws operated by a power screw turned with an ordinary ½" ratchet wrench. It reaches into corners, channels, etc., and can be operated in limited space.

## ALL METAL SOLDER

AN aluminum and all metal solder called Alumaweld has been discovered by a prominent California engineer and metallurgist. After a series of extensive tests by ground schools it has been pronounced satisfactory for aeronautical work. Alumaweld soldering replaces welding in engine repairs and is applied without tearing down the engine.

For the repair of aluminum and die castings, it is applied with a soldering iron or blow torch without flux. It may



Norton crankshaft lapping machine

also be used on cast iron and steel, using a special flux. It is over ten times as strong as ordinary solder.

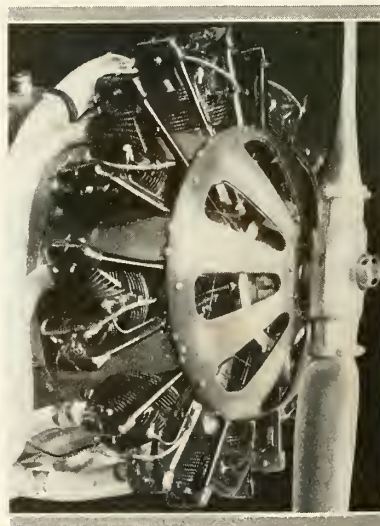
Any metal repair, whether it be on the plane or on shop equipment, can be made with this solder. Alumaweld is a product of the Allied Research Laboratories of Glendale, Calif.

## HELYX-NAILS

A NEW heavy duty nail for aircraft builders makes possible a permanent attachment of wood to metal, metal to metal and wood to wood, which will not loosen or back out under vibration. This product was recently introduced by the Hillwood Manufacturing Company of Cleveland, Ohio.

The nail, known as the Helyx, is made from a special composition high carbon steel square wire twisted into a spiral coil.

While this nail is not hardened it has so much backbone that when driven through a drilled hole in metal it automatically threads itself into the steel.



Pratt & Whitney engine with fuel injection

## NEW TYPE HORNET ENGINE

A NEW type Hornet aeronautical engine utilizing the principal of atomization and injection of gasoline direct to the cylinder chamber has successfully completed its dynamometer and flight tests and has been installed in a Boeing 40-B-4 mail plane on the Boeing division of the United Air Lines for the purpose of determining its desirability under service conditions. The Pratt & Whitney Aircraft Company of East Hartford, Connecticut, a division of the United Aircraft & Transport Corporation, after more than a year's experimentation with this new method of fuel distribution, has been successful in perfecting the mechanisms which permit the elimination of the fuel distribution problems encountered with the use of carburetor, air scoop and preheater.

The Hornet equipped with this new device develops in excess of 525 horsepower and with the exception of the fuel distributing system is essentially the same as the Series A-2 Hornet. By the direct injection of gasoline as provided by this new departure in fuel distribution, the hazards of cold weather operation are completely overcome. Perfect operation is assured regardless of the air temperature. Cold starting is greatly facilitated and the difficulty previously encountered with ice formation in the carburetor during winter operation is eliminated.

The fuel injection Hornet is an important step toward the utilization of less inflammable fuels such as the hydrogenated or safety fuel produced after exhaustive experiments by the technicians of the Standard Oil Company of New Jersey, according to A. V. D. Willgoos, Chief Engineer of the Pratt & Whitney Aircraft Company. It is believed that future developments of this model will use such fuels with the same efficiency as gasoline. It is produced by the hydrogenation process with particular attention to high flash qualities and has an octane number of 82.6 without the addition of any knock suppressor. Experiments have indicated that fuels produced by the hydrogenation process have inherent anti-knock value—a characteristic of great importance to aircraft engines. The temperature at which the fuel will ignite is 107 degrees F. as compared with the flash point of ordinary gas which is anywhere from 28 degrees F. to 46 degrees F. The non-inflammable characteristic of the fuel at low temperatures will insure against possible fire in crash.

The engine has successfully passed its rigid 50 hour block test and has proved itself efficient in every flight test.

The engine will not be offered to the trade for general use at this time.



**GEAR FINISHING BROACHES**

ONE of the requirements of the automotive industry has been to increase the production on internal gears. They have been able to do this by the use of internal gear tooth form broaches which have a true involute tooth form. The development of this type of broach opens many new fields at a saving of cost over the previous methods used.

The Excello Aircraft & Tool Corp. manufactures this type of broach, which has the involute tooth form on each spline. The gear is finished in one pass of the broach and no additional operations are necessary, such as grinding or boring.

The broaches start from a drilled hole. The teeth in each row must be absolutely straight to insure high accuracy and finish. The section at the pull end of the broach is designed for sizing the hole and the remainder of the broach for broaching the form on each tooth. A range of diameters with a corresponding range in number of teeth can be furnished.

The limits of these broaches were held to 0.0003" on the splines, outside diameter to 0.0001" and the accumulated error in the spacing of the teeth not to exceed 0.0002". The first section removes approximately 0.045" stock. The pull end is designed for an automatic coupling which simplifies and speeds up the handling of the broach during the broaching operation.

**G. E. GASKET MATERIAL**

A NEW gasket material, moisture-proof, and highly oil-resistant, has been announced for sale by the General Electric Co. This material, known as No. 1000 Compound is recommended especially for applications where the primary purpose of the gasket is to exclude moisture, for which purpose it has been found superior to cork or other rubber compounds.

It is a white, odorless, sulphur-free rubber compound, available both in sheets and moulded shapes. It is extremely tough, strong, flexible, requires no sticker, and can be used repeatedly in testing work, as well as in permanent joints. It is unaffected by exposure to the weather, and when under compression, in properly-made joints is not attacked by cold oil. In contact with hot oil it is practically unaffected where enclosed in recessed joints under compression, but is not generally recommended where resistance to hot oil is of prime importance.

**OIL-RESISTANT CABLE**

A NEW ignition cable especially developed to resist oil and wear due to excessive vibration has been announced by the Belden Manufacturing Company, 4689 West Van Buren Street, Chicago, Ill.

Tinned copper wire (19x27) is embed-



Belden Ignition Cable

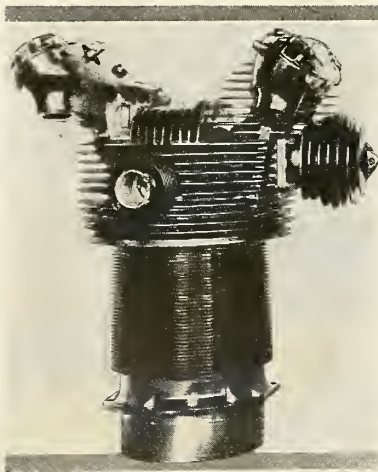
ded in a specially developed orange rubber insulating core. A cotton braid is applied which is impregnated with Beldenlac Aircraft Standard Lacquer. At this point the cable is the same as the regular Beldenlac Aircraft Standard Ignition Cable. Over this is wound varnished cambric tape. A cotton braid over the tape is coated with Beldenlac Aircraft Standard Lacquer. Thus the new cable has three strong protective layers besides the usual insulating core, braid, and lacquer.

**BALL BEARING APPLICATIONS**

A NEW series of bearings has been developed by the Fafnir Bearing Company of New Britain, Conn. Particularly suited to torque tubes, this bearing is designed to have weight-saving value in applications where loads are moderate, speeds low and the main requirement is elimination of friction.

**WESTINGHOUSE BENCH**

A BENCH designed to indicate the slightest deformation on a piece of metal under stress has been developed by Dr. I. A. Nadai of the Westinghouse Research Laboratories. When applied to model tests, reduced to size, reproducing similar conditions as those under which red hot steel goes through the rolls, this bench shows in advance how various stresses are distributed. The use of this instrument in manufacturing processes such as the rolling of steel will effect great savings per year in the power required in the steel mill industry alone, according to Westinghouse officials.



Type "E" Wright engine cylinder

**BACKFIRE TRAP**

THE new Type "B" Oberdorfer backfire trap, a safety device designed to eliminate the danger of fire from backfire explosions, has been developed by the M. L. Oberdorfer Brass Company, Syracuse, N. Y. The trap is a small compact device of non-corrosive metal, which clamps over the air-horn of the carburetor. The outer end consists of alternate windings of straight and corrugated flat metal. According to officials of the company, the trap interferes in no way with the operation of the engine and functions as an air cleaning device in addition to rendering harmless the most terrific backfire so that highly explosive substances will not be ignited.

**WRIGHT CYCLONE CYLINDER**

THE new type "E" cylinder head now used on all Wright Whirlwind and Cyclone radial air-cooled engines is designed to bring about lower and more uniform head temperatures. One of the principal features of this new cylinder head which has about 50 per cent. more available cooling area than the head used on previous models, are the two spark plug coolers which serve to dissipate the heat from the point where it is most intensified. These spark plug coolers are composed of bronze inserts of standard design cast integrally with aluminum alloy cups which are finned on the outside to provide cooling area for the inserts. Ignition wire terminals are attached to the end of each ignition wire completely enclosing the spark plugs and protecting them from the corrosive action of the weather. They also adapt the engine to complete radio shielding.

The intake ports of the "E" type cylinder face the rear of the engine as on previous models while the exhaust ports face the side. The exhaust ports are supplied with finned cast aluminum elbows. Standard elbows which face the front are used with the front exhaust collector ring but another type of elbow may be supplied to face the rear, for use with short open stacks or on rear exhaust collector. These finned elbows, together with heavily finned exhaust rocker boxes have aided materially in making possible the attendant benefits derived from the marked reduction in operating temperatures.

The rocker support boxes are of a new design with increased felt capacity for lubricating rocker arms, rocker arm roller, bearings, and push rod ball end. The reduction in maintenance, time and cost has been effected by the use of balls which hold the rocker box covers in place instead of the screws formerly used.

An exhaust manifold is furnished as standard equipment with the "E" type Whirlwind engine.

# THE BRISTOL TYPE 118 WARPLANE

**S**OME of the most strenuous and important work done by any fighting air force is allotted to so-called general purpose airplanes which may be called upon to perform many and diverse duties.

The widely variant tasks laid on the Royal Air Force have obligated British aircraft constructors to pay particular attention to the design of high-performance airplanes able to fulfill this difficult work.

Machines of this kind in the British air services are required to execute many operations, including defensive and offensive fighting, day-bombing, aerial photography, reconnaissance, communications, and gunnery spotting. At the same time high speed and good flying performance are essential.

One of the latest British airplanes designed for these requirements is the Bristol Type 118, an all-metal biplane which is notably fast and is capable of flying performance beyond the powers of most earlier planes of similar type.

In normal use the machine carries a crew of two men, a pilot and an observer who also performs the duties of rear gunner, bomber and wireless operator. In addition the machine is fitted to carry two stretcher cases, one in the bombing station and the other in the upper part of the fuselage aft of the rear cockpit. This arrangement adds considerably to the value of the machine on active service.

The pilot's seat is located just aft of the rear or trailing edge of the upper plane, which is thinned down to improve forward view. Immediately behind the pilot is the observer's cockpit. When the observer's seat is folded up and the floor pushed back in sliding grooves—the work of a few seconds—the observer

can reach the bombing station located in the nose of the machine through a "tunnel" beneath the pilot's cockpit. Once in position the observer lies prone, ready to aim from the best possible sighting point.

The Type 118 derives power from a fully supercharged Jupiter or Mercury air-cooled radial engine developing a maximum of 525-575 h.p. at heights between 11,000 and 13,000 feet.

Frise ailerons are fitted to the top planes only. The tail plane setting is adjustable. Shielded horn balances are incorporated in the elevators, and the rudder balance is shielded by the fin which is offset. The engine installed drives a 12 foot diameter two-bladed propeller with a 10 foot pitch.

One Vickers .303-inch gun on the port side is operated by the pilot, and provision is made for 600 rounds of ammunition. The gunner operates the Lewis .303-inch gun mounted on a balanced type Scarff ring, with stowage for six double drums of ammunition. Racks are provided on the bottom of the fuselage for carrying alternative loads of bombs, namely (1) 16 of 20 lbs.; (2) or 4 of 112 lbs.; (3) or 2 of 230 lbs., or 250 lbs. In addition, five practice bombs are carried in a crate beneath the fuselage. Both pilot and bomber are provided with salvo-selector release gears.

Provision is made to carry a camera on an adjustable and detachable mounting, immediately forward of the bombing station. This can be operated from the bombing station or by the pilot.

The "three panel" radio system is provided for, and stowage arranged aft of the rear cockpit. The pilot operates the radio-telegraph panel through remote controls, and the observer the continuous wave and interrupted continuous wave panels.

The engine is bolted to a forged and turned ring of angle section, attached to the fuselage by steel tube struts and stays. Taper bolts are used throughout and the mounting is quickly detachable.

A panel of 1/8-inch thick asbestos is placed between two sheets of 24 S.W.G. aluminum to form a fireproof bulkhead.

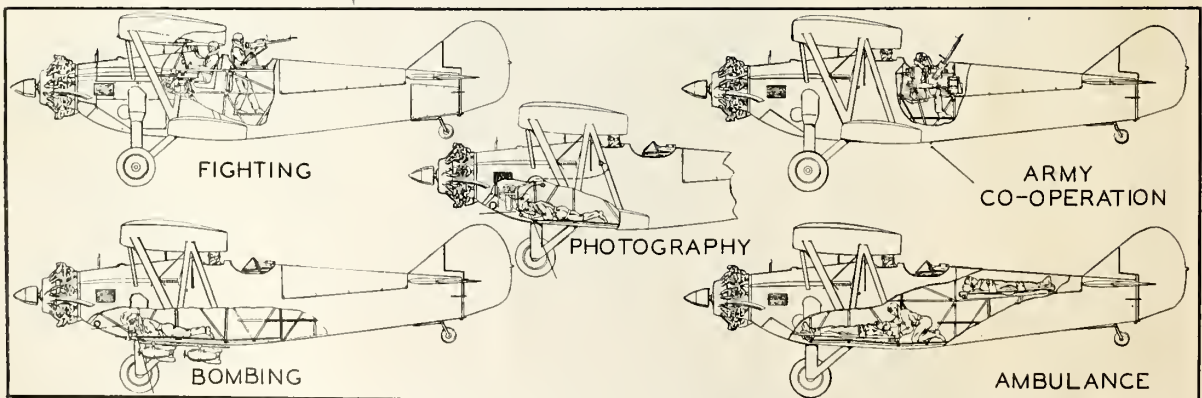
From the aft of the engine mounting to the rear of gunner's cockpit the fuselage is built of round steel tubing bolted between flat high tensile steel joint plates; from aft of gunner's cockpit to front spar of tail plane, of high tensile steel strip sections rivetted to flat high tensile steel joint plates; the rear end structure carrying fin, tail skid and rudder is of construction similar to that of the rear end. By removing four bolts this wedge may be quickly detached from the fuselage.

The undercarriage is of the divided type, each half consisting of a wheel (800 x 150), axle, radius rod, and oleo leg. A Vickers oleo pneumatic unit is incorporated in each oleo leg. Vickers hydraulic brakes are operated by a hand lever and differential braking is obtained through a valve box operated by the rudder bar.

The tail skid consists of a telescopic member, hinged to the fuselage at the top end and restrained at the lower end by a radius rod. Rubber compression blocks provide the springing for this member which is fitted at its lower end with a swivelling pan which can be quickly replaced.

The "N" wing struts are built up of high tensile steel strip with aluminum fairings, while the lift strut is built up of two separate high tensile steel strip sections.

Ailerons are of the Frise balanced type and are fitted to top wings only.



Diagrams illustrating five variations of the Bristol Type 118, a new general purpose biplane used by the Royal Air Force

The fuel system is of the gravity type, having a normal capacity of 100 gallons. Total with emergency supply, 160 gallons. The normal supply is carried in two tanks of 50 gallons each, one in each inner end of top wings. The extra supply is carried in two tanks of 30 gallons each in the top centre section. All tanks are of tinned steel, are fitted with contents gauges, cocks (controlled from cockpit) and are easily detachable. From each tank a monel metal feed pipe leads to a manifold at the forward end of the fuselage. At the lower end of each pipe is another cock, under the control of the pilot. A single pipe leads from manifold to filter, and another from filter to carburetor.

A tinned steel oil tank holding 10 gallons is mounted on the forward end of the fuselage. A combined cock and drain plug is fitted in the supply pipe to engine. The oil is returned to the tank through a separate cooler mounted on the port side of the fuselage. This cooler consists of a series of oval section tubes, connected in parallel, protruding through the side covering of the fuselage. An adjustable spring loaded valve bypasses the oil until a normal working temperature is reached.

A standard type of control column is fitted for elevator and aileron control. The foot control has a 4-inch quick adjustment fore and aft, without altering cable lengths. A large diameter hand-wheel operates the tail adjustment. This is provided with an indicator. Engine control is by push-pull rods except at the fireproof bulkhead, where Ahrens



The Bristol general purpose two-seater military airplane

control units are used.

The pilot's seat is adjusted, over a height of 4 inches, by means of a lever on the starboard side, and is shaped to house the seat type parachute. The gunner's seat faces aft, and when required can be folded up clear of the cockpit.

The Vickers gun is fitted on the port side of the pilot's cockpit on an adjustable mounting.

**Specifications**

Span, top wing	.....40 feet, 8 inches
Span, bottom wing	.....28 feet, 8 inches
Length over all	.....34 feet
Height (tail down)	.....12 feet
Weight, empty	.....3300 pounds
Total loaded weight	.....5200 pounds
Speed at ground level	...140 miles per hour
Speed at 12,000 feet	...163 miles per hour
Speed at 16,000 feet	...160 miles per hour
Speed at 20,000 feet	...151 miles per hour
Climb to 10,000 feet	.....10.6 minutes
Climb to 15,000 feet	.....16.5 minutes
Climb to 20,000 feet	.....22.1 minutes
Ceiling	.....25,600 feet

**LIGHT SIGNALS**

A Study of Light Signals in Aviation and Navigation, I. Langmuir and W. F. Westendorp. A. S. M. E. Preprint, 19 pp., 14 figs., 8 tables.

THE results of laboratory experiments devised to measure the visibility of light signals under conditions essentially similar to those encountered by the aviator or navigator, are discussed. Data have been collected on the direct visibility of flashing-point sources of light of different colors, flash lengths, and intervals, against different backgrounds. The time taken to locate a visible beacon was studied as a function of the beacon intensity and frequency of flashing.

The threshold candlepower required for visibility of a point source against a background is given by an empirical equation. Colored point sources were not found to be useful except in the case of red lights with background intensities above moonlight. For an airplane approaching a beacon it was found advantageous to use frequencies of flashing as high as 12 to 30 per min., although with exceptionally clear atmosphere, lower frequencies may be better. In a study of the visibility of flashes of diffused light superimposed on a steady white background, white-light flashes gave the best results.

A selective differential photoelectric receiver is described which detects signals of modulated diffused light of low intensity. This sensitivity is independent of the steady background brightness up to 100 times moonlight, and is from 6 to 13,000 times as great as that of the eye in the range of background intensity from darkness up to moonlight.

The greatest difficulty in the transmission of light signals through fog was found to lie in the loss of advantages of the point source. It was discovered that dense fog may increase the distances at which diffused-light signals may be detected. The range depends on the reflectivity of the ground to a considerable extent. A theoretical treatment of the diffusion of light through fog, based on the scattering of light rays by fog particles, indicates that airplanes may be guided through fog at a distance of several miles.

**Digest of Contemporary Technical Articles**

By Elsa Gardner

**CONTROLLABLE-PITCH PROPELLERS**

Design Problems of Controllable-Pitch Propellers, W. B. Heinz. A. S. M. E. Preprint, 6 pp., 8 figs.

THE author presents analytical studies of the most common problems encountered in the designs of mechanisms to rotate propeller blades about their axes. He describes means for retaining the blades in the hub structure, which will be capable of resisting the high centrifugal forces exerted and yet readily allow each blade to be turned about its own axis, and discusses centrifugal thrust-bearing loads. He analyzes the torque created by centrifugal force as well as lateral bearing loads from which their frictional torques can be determined. He investigates the centrifugal torque of multiple masses by means of which a counterbalance can be designed to neutralize the centrifugal blade torque to any desired extent and at all settings.

The analyses are carried further than

in any previous published work, and results are reached by which quantitative design data can be obtained with minimum numerical and graphical labor.

**WELDING STRAINS**

The Relief of Welding Strains by Annealing, C. H. Jennings. Am. Welding Society Journal, Sept., 1931, pp. 26-29, 3 figs.

THE test procedure and results obtained in an investigation of the effect of three annealing temperatures and various soaking times on welding strains in welded structures are discussed. It was found that welding strains and residual stresses could be reduced by annealing at temperatures below the critical point of the material. The effectiveness of annealing depended upon the annealing temperature and the soaking time. In order to obtain a given minimum residual stress, the higher the annealing temperature, the shorter the soaking time which was required. It was proved that by proper annealing residual stresses in welded structures could be materially reduced.

## MOBILE MAST FOR MOORING THE AKRON

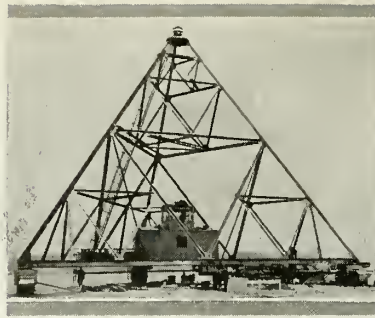
**T**HE U.S.S. Akron while on the ground outside its dock is hitched to a low tripod mooring mast on caterpillar wheels, a recent development to facilitate the ground handling of large airships. An airship can be left moored to it, to swing in the breeze like a weather-vane, overnight or for a week if need be. Also it is used to tow an airship out of or into the dock; it replaces the hundreds of men previously required to tug on the lines dangling from the ship to move it about.

The mobile mooring mast at Akron was designed and built by the Wellman Engineering Company to be used with the ZRS-4 (the "Akron") and the ZRS-5 now under construction for the U.S. Navy, and with future ships constructed at the dock of the Goodyear-Zeppelin Corporation.

The three legs of the tripod rest on caterpillar feet equally spaced on a hundred foot circle. At the apex, 76 feet above the ground, is the cone-shaped cup into which fits the cone on the bow of the airship—the mast-to-ship connection agreed upon internationally as standard.

Two of the caterpillars provide the traction and are driven by a 125 hp., 250-volt direct-current Westinghouse motor mounted on the framework between them. It drives the two caterpillars through a differential gear and long drive shafts with universal joints. The third caterpillar is for steering. It is driven by an 8 HP. Westinghouse motor through a rack and pinion system.

The mast also carries its own power plant. Supported on the cross members of its base is a small house containing a 250-hp. 1,200 rpm. gasoline engine driving a 125 kw., 250 volt direct-current Westinghouse generator and a combina-



tion exciter and auxiliary generator rated at 18-kw., 125 volts.

Besides supplying power to steer and propel the mast, the main generator furnishes power for the 30 hp. winch motor, which hauls in the main mooring line of the airship. Simultaneous operation of the winch motor and the traction motor is prevented automatically by the contactor system. These contactors are mounted on a panel in the generator room.

All electric controls are located in the pilot room just above the power plant. From this position, some twenty feet above the ground, the pilot can see clearly on all sides and control the direction and speed of the mast. Using variable-voltage control the speed can be varied from a quarter to two and a half miles per hour.

The mast, while serving as a mooring for an airship on the field, also supplies the power for servicing the ship with water and fuel. The motor-driven pumps are mounted on the base cross members. One pump delivers 50 gallons of gasoline per minute from the ground through a hose running up one leg of the mast and into the bow of the ship. One hundred gallons of water per minute are pumped by the other unit through a similar hose connection. Control switches for the pumps are located both at the motors and at the platform at the top of the mast.

Swiveling floodlights are mounted at each corner of the mast.

## THE RESILIENT STRUCTURE OF THE AKRON

**T**HE pneumatic principle involved in the operation of aeorol shock-absorbing struts for airplanes has been applied for the first time in lighter-than-aircraft through resiliency devices supplied by the Cleveland Pneumatic Tool Co. of Cleveland, Ohio, for the U. S. Navy's new airship, the U. S. S. "Akron."

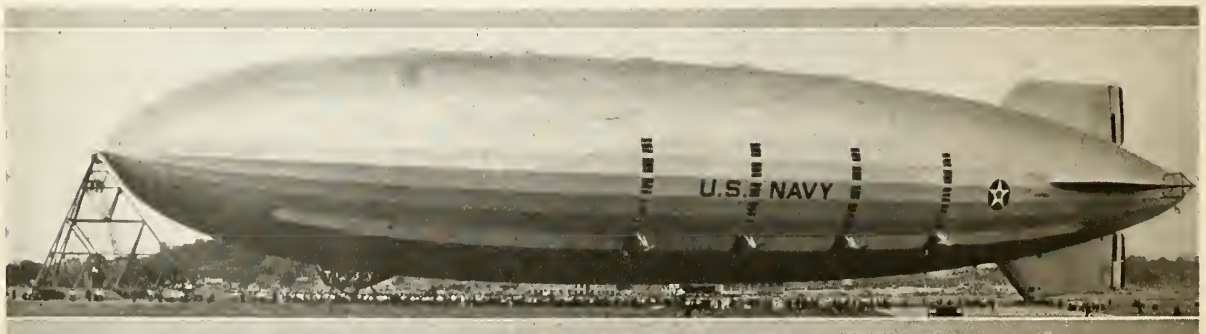
These devices, consisting of a cylinder and piston, operating with helium sealed in a special compound to prevent its escape, are attached to the main frames or rings and serve the important purpose of relieving undue strains on the bulkhead and structural parts of the main rings.

Through operation of the struts, the bulkhead, or diagonal netting of steel wires, which are strung in a spiral to the center and which separate the huge gas cells, which is kept taut under ordinary conditions, is made resilient to take care of overload represented in the surging and shifting of the bags under pressure while the airship is in flight.

When a gas cell is deflated, the resiliency devices, or struts, permit the supporting nets around the bags to shift and expand. The pull of the diaphragm mesh is thus balanced at all times by the compression gas between the pistons and cylinders, due to the telescoping movement of the pistons. This action gives progressive ratio of absorption of the strain.

The initial pressure in the resiliency devices provides the advantage of stability for the bulkheads, allowing certain freedom of movement for the gas cells, without which excess strains might be set up in the net supporting structure.

The resiliency devices allow more surging for emergency purposes and yet keep the surging at a minimum before



The U.S.S. "Akron" attached to her movable steel tripod mooring mast at Akron, Ohio

the stresses exceed a certain limit.

There are 120 of the struts in the *Akron*, twelve attached to each of the ten main frames. These frames are of two types, main and intermediate. The main frames represent an innovation in present-day airship construction. They consist of two outer annular rings connected by cross girders, fashioned in zig-zag style to an inner annular ring, thus forming a rigid annular structure of triangular cross-section.

The main frames are about 74 feet apart and are interspersed by the intermediate frames. The gas compartments are set between the main frames.

The struts which operate as a tension unit, instead of a compression unit, as is the case of Aerol struts installed on airplanes, are attached to the inner ring joint of the main frames at each odd and a half joint beginning at a point just above the lateral gangways.

No struts were placed at the bottom of the rings as most of the pressure is at the top and the gas cells are flabby at the bottom.

The devices vary in length from 9 in-

ches to 32 inches, the longest being placed at the top to meet the greatest pressure and the others tapering off. They also vary in stroke from 2 inches to 14 inches, the longer stroke coinciding with the greatest amount of pressure. They were made with two different diameters, two and a half inches and three inches, varying longitudinally with the shape of the Zeppelin, those of shortest length being at the extreme forward and extreme aft main frames.

The load carried by the gas bags, the cubic content of which varies from about 200,000 cubic feet to 900,000 cubic feet, is not constant or even and the different sizes of the devices were made for the maximum loads to be met at the particular points where they were installed.

In addition to the piston and cylinder, the units are composed of valves at the top through which gas is inserted, lock nuts, piston heads and false bottoms. The latter, made of duralumin, serve as a protecting cap against chafing of any fabric or nicking of wires since the lower part of the devices are arranged so that they swing free.

are located approximately 35 feet from the engine room on each side, so that it is a matter of a comparatively short distance from each engine compartment to a telephone. Orders from the bridge to engine rooms are conveyed by a "marine telegraph" system similar to that in use on surface ships, rather than by telephone.

Telephones are to be found in the gangways outside the officers' and crew's quarters, in the generator room, the airplane compartment, the observation and gun platform in the extreme stern, and in the auxiliary control station in the lower vertical fin. Provision is made in the auxiliary control station for plugging in a line leading to a head set to be worn by a man on the ground, who can assist the captain during ground maneuvers.

The instruments are similar in appearance to the small square type sometimes seen in factories. The switches are gas tight and the telephone box is suspended by springs from its four corners to prevent any interference by vibration. Instead of one ear phone as in the usual equipment, two are provided and they are fitted with rubber cups which shut out extraneous noise. Special circuits have been provided for other types of phones which may be installed by the Navy if desired.

The telephone cables in a dirigible present difficulties not encountered in any other type of telephone installation. Kellogg designers were confronted with specifications for conductors of low resistance and extreme lightness, without tendency to crystallize and break under vibration, without soldered joints and with an overall metallic braid for mechanical protection and shielding against static and radio interference.

For conductors a No. 20 B. & S. gauge equivalent stranded bronze wire was chosen. Over this a thin wall of rubber was applied and then a closely-woven braid of cotton. For further moisture protection, twelve coats of lacquer were applied to the braid. The conductors thus completed were twisted into pairs and laid in place. Where the junctions would otherwise be tapped out to each station, the uncut pair was simply turned out of the main cable and cut to the length necessary to reach the specified telephone.

Over this harness a cotton braid was applied and made impervious with twelve more coats of lacquer. For shielding a network a fine aluminum alloy wire was braided over the entire cable giving it a flexible metallic armor of extreme lightness and strength.

The Kellogg Switchboard and Supply Company worked in close cooperation with the Navy and Goodyear-Zeppelin engineers, handling complete details of the design and manufacture of the entire system.

## Ingenious Telephone System Aboard the U.S.S. Akron

R. A. Parlett, Jr., *Manager Switchboard Sales Dept.*  
Kellogg Switchboard and Supply Company

**A** FLYING telephone system, nearly three city blocks long equalling in efficiency and number of instruments the equipment found in an apartment house, is installed in the *U.S.S. Akron*.

The system includes seventeen separate telephones, located at strategic points from the bow to the stern of the *Akron*, to provide communication between all parts of the ship. When the craft is moored, a line may be plugged into an outside system, allowing local or long distance calls to be made directly from the ship.

The necessity for weight conservation was responsible for use of aluminum and aluminum alloys wherever possible and as a result its total weight, including the seventeen instruments, switchboard and three miles of cable, has been reduced by Kellogg and Goodyear-Zeppelin engineers to less than 250 pounds.

The switchboard is located in an opening in the bulkhead between the control room and the chart room, and may be operated from either room. The switchboard box, which is gas tight, is made of welded aluminum. The board will handle three separate conversations at once, but should additional calls come in it will be necessary to interrupt one conversation. Power for the system is provided by a 24-volt circuit from the generator room.

When the ringing key on the switchboard is pressed, a musical sound—approximately the key of C, which experts say is more audible than any other—issues from the instrument to which the call is going. If desired, all instruments may be "rung" at once, and the sound used to transmit code messages throughout the ship. Should the captain of the *Akron* desire to speak to all phones at once he may do so, issuing general orders to every strategic point.

Running from the officers' quarters above the control room, to the box, is a gangway in which three phones have been installed. The first is a general utility instrument serving the officers' quarters. The next is further up the gangway toward the bow and is located adjacent to important fuel valves, while the third is in the bow itself and is very necessary during a mooring operation. Also running up the forward gangway is a line which may be attached to an outside city circuit after the *Akron* has been moored to a mast, making the ship's installation a part of the local telephone system. On the top of the *Akron* will be observation and gun platforms and telephones are provided in each of these.

Extending along each side of the ship are lateral gangways, where several instruments have been placed. Telephones

# THE AIR SERVICES

## *Sixty-five Officers Attend Conference of Engineering and Supply Divisions*

THE annual Engineering-Supply Conference held at Wright Field from December 1st to 4th brought to the field this year forty-five visiting officers from all the major fields and depots in the country. Together with those from Wright Field and Fairfield who participated, the total number of officers in daily attendance was sixty-five. This assemblage, which brings back many officers formerly stationed at Wright or McCook Field, is always in the nature of a reunion. The program included an opening address by Brigadier-General H. C. Pratt, Chief of the Materiel Division.

The purpose of the Conference is the discussion of Engineering and Supply problems from the Service and Materiel Division points of view, the consideration of existing weakness of policy, and the formulation of new policies. A resume of the action taken by the Materiel Division on engineering problems discussed at the last conference was presented by Major Howard, as well as a review of the various developments in airplanes, engines and equipment in progress during the past year.

## *Navy Accepts the Akron*

THE Navy Department has accepted the Akron upon its recommendation by the Board of Inspection and Survey as an air-worthy ship in accordance with contract and specification.

The extra weight which was the subject of much comment and criticism, it is explained, is the result of increase in strength. The speed of the ship will be brought to contract maximum by the installation of a new set of propellers, now being provided.

## *Marine Corps Surveys Haiti Coast*

An aerial survey of a section of the northern coast of Haiti is to be made before February 1, by Marine Corps Observation Squadron 9-M, commanded by Major J. E. Davis, USMC, and stationed at Port au Prince, Haiti. An amphibion plane from the Scouting Force will operate with the squadron during the survey.

The survey will be made for the Hydrographic Office of the United States Navy, which has received requests for more detailed information in regard to perils to shipping in that vicinity, and also to check reported inaccuracy in the position of the light on St. Marc Point, which is the southern approach to St. Marc Bay.

The area to be surveyed extends from St. Honore Point, eastward of Acul Bay to the Massacre River, the boundary between the Republic of Haiti and the Dominican Republic.

## *Navy Conducts Cold Weather Flights*

THE airplane carrier Langley with its squadrons of fighters cruised into northern waters on November 30 for the Navy's first aircraft maneuvers in extremely cold weather. They were to remain for two weeks between the port of Provincetown, Mass., and Bar Harbor, Maine.

Operation of the airplanes, the effect of ice and snow on the flight deck and arresting gear, the action of machine guns at low temperature and the ability of personnel to work in heavy clothing were problems to be given attention.

## *Marine Corps Organizes Sea Squadrons*

TWO squadrons, composed of six scouting units each, have been attached to the aircraft carriers Lexington and Saratoga, as the first Marine Corps Squadrons organized for duty afloat. They are known as VS Squadron 14-M and VS Squadron 15-M, and are designed to give aviators of the Marine Corps actual experience in carrier operations.

## *Air Corps Develops Hollow Blade and Controllable Pitch Propellers*

RESEARCH of the Army Air Corps on propellers is being concentrated on the development of hollow blades and controllable pitch. Work along both lines is being met with considerable promise of success.

The hollow blade type of propeller has been found to have advantages not only in reduction of gross weight but also in permitting the use of lighter bearings. Welded blades have already reach the service test stage; pressed tubular blades are still in the experimental stage.

The controllable pitch propeller is of especial value in high altitude work, such as military flying often calls for. The development of this type is dependent to a large extent upon hollow blades and advancement in the use of magnesium, as the weight of the blades under the usual methods is excessive.

## *Hydrographic Office Charts Northeast Sections of the United States*

FOLLOWING request for charts of the land to be used by airships, the northeast portion of the United States is being charted as the sea has been for ocean-going ships. The new type of map, being prepared by the Hydrographic Office of the Navy Department, will show the elevations of the land relative to sea level and will be constructed on the Mercator projection.

The present project covers territory extending from Norfolk to Boston and west to Dayton and Detroit. Later the southwest section of the United States, where the Akron is to have a base, will be charted.

The large size of these maps will make them unsuitable for airplane use, the Hydrographic Office said.

## *Tests Determine Army's Best Bomber*

LIEUT. D. D. Graves, officer of the 95th Pursuit Squadron, recently won the title of the most accurate aerial machine gunner and dive bomber in the Army Air Corps during recent competition at Langley Field, Virginia. The tests included firing from the air at ground targets and aerial targets from the air. Lieut. Graves amassed the greatest number of points.

## *94th Pursuit Conducts Experiments In High Altitude Flying*

THE first cross-country flight at an altitude of 20,000 feet, in which all of the pilots used liquid oxygen, was completed recently by the 94th Pursuit Squadron, when twelve planes under the command of Lieut. Harry A. Johnson flew from Selfridge Field to Washington, D. C.

The flight determined the fact that liquid oxygen is superior to gas oxygen carried in cylinders, the equipment necessary being more efficient and more comfortable on a long flight.

Some difficulty was experienced in fogging of the goggles. It was found that below twenty degrees zero Centigrade all goggles of the type used by this squadron will fog until it is impossible to see through them. The flying suits were found to be too light for extended use at such altitudes.

## *Lieut. Mayhew Wins Patrick Trophy*

FIRST Lieut. Don W. Mayhew won the fourth annual Major-General Mason M. Patrick Trophy Race recently held for the second consecutive time at Fort Crockett, Galveston, Texas. His speed was 142.59 miles per hour.

Lieut. Eric Danielson and Lieut. Richard A. Morehouse finished in second and third places, respectively.

The Galveston Cup, offered by the Galveston Chamber of Commerce, was awarded to Second Lieut. Robert K. Taylor for the outstanding achievement of the year.

## *Navy Develops Aircraft Plotter*

THE Hydrographic Office, Navy Department is developing an instrument for the use of airplane pilots in mapping courses. The device will be known as an aircraft plotter.

This new instrument simplifies the ascertaining of directions and distances and permits actual marking of the course on the chart beneath the device. An experimental model is being constructed in the Hydrographic Office.

### *Air Corps Publishes Organization List*

THE Air Corps News Letter of December 4 publishes a listing of Groups, Squadrons, Balloon Companies and Photo Sections of the Air Corps, with their commanding officers and station. A brief description of the squadron insignia is given where such have been approved.

### *Fifth Photo Section Makes Mosaic Map*

A MOSAIC of the Calumet Area was recently made by the Fifth Photo Section, stationed at Scott Field, Belleville, Ill., for the District Engineer of the First Chicago District. This area of 260 square miles was photographed by Second Lieut. H. F. Woolard, commanding the Section, and Master Sergeant Wilbur R. Rhodes, using an O-25A Observation plane and a K-3A camera. Flying time for the project was five hours.

### *Vought Corp. Gets \$2,000,000 Contracts*

CONTRACTS totaling \$1,744,311 have been awarded by the Navy to the Chance Vought Corporation, East Hartford, Conn., for twenty-eight observation planes of one type and sixty-five observation planes of another type.

Orders made in October bring total planes to be delivered by this concern to 108 planes, which, together with spare parts, will have a value of \$2,024,961.

### *Boeing Delivers First of New Fighters*

THE first of the 75 Wasp-powered F4B-3 and F4B-4 airplanes on the contract of the Boeing Airplane Company with the Navy was flight delivered from Seattle to Anacostia, D. C., last month. At Anacostia the single-seater Wasp-powered fighter was turned over to the Naval Trial Board which was conducting tests on it during the latter part of the month.

The Boeing plant is rushing production on the next twenty airplanes of this contract in order that delivery of these planes may be made early this month. The remaining 54 airplanes on the 75-plane contract are being designated as F4B-4's as they include a change in wing construction to meet new naval requirements.

### *Army Takes Delivery on Sixty Pursuits*

AT the close of 1931 sixty Wasp-powered P-12E Army pursuit planes had been delivered by the Boeing Airplane Company on its contract with the Army Air Corps for 135 pursuits. Deliveries last month included a number of airplanes destined to be shipped from March Field, Riverside, Calif., to Cristobal, Panama, for Air Corps service in the Canal Zone.

### *35th Division in New \$100,000 Quarters*

THE 35th Division Air Service, Missouri National Guard, consisting of 110th Observation Squadron, 110th Photo Section and 110th Medical Detachment, is getting settled in the new \$100,000 quarters provided



The P6E Curtiss Hawk, Conqueror-powered, with cantilever landing gear

by the City of St. Louis at Lambert-St. Louis Field. Improvements and additions to the hangar are being effected through a \$10,000 appropriation provided by the State of Missouri.

While going ahead with the outfitting of its quarters, the Missouri organization is also carrying out an intensive training program, according to Major Philip R. Love, commanding officer.

### *New Cooling System Is Developed*

A NEW development in chemical cooling systems for aviation engines, designed to reduce flying costs, is incorporated in an engine recently delivered to the U. S. Navy Department by the Comet Engine Corporation of Madison, Wis.

The engine has passed navy acceptance tests and the system, the result of several years of experimental work, is claimed to have the advantages of both direct air cooling and liquid cooling without the disadvantages of either.

### *Reserves at Oakland Open Classes*

AUTUMN GROUND school classes of the Naval Reserve Aviation Squadron at the Oakland Municipal Airport, Oakland, Calif., opened recently with an enrollment of thirty-five students. Seven months of basic aeronautic training is offered to these students who are selected university graduates. Upon completion of this work at Oakland, a limited number of students will be selected for a month's elimination flight training at Sand Point, Wash. Those who pass these tests will be sent to Pensacola, Fla., for advanced training and an opportunity to qualify for a Reserve commission following a year's active duty with the Fleet.

Six planes used by the Oakland unit of the Naval Reserve were recently augmented by three more Curtiss Hell Divers. Lieutenant Commander F. B. Connell, commander of the squadron, and Lieutenants J. W. Hughes and E. B. Von Adelung, took delivery of these planes at Buffalo, N. Y., and flew them to Oakland.

### *Army Orders Forty-six Curtiss Hawks of New Speedy Type*

THE Curtiss Aeroplane & Motor Company at Buffalo will deliver forty-six of the fastest standard pursuit planes built when they complete a contract for this number for the U. S. Army Air Corps.

This fast plane, known as the P6E Curtiss Hawk, has a speed of 197 miles per hour and cruises at 160 miles per hour.

The latest type P6E, a development of the P6, is basically the same as previous models except that refinements have increased the performance qualities with reductions in weight and head resistance by use of Prestone chemical liquid cooling developed by the engineering section of the U. S. Army Air Corps at Wright Field, Dayton, Ohio.

The rate of climb has been increased to 2,100 feet per minute. The plane can climb to 16,000 feet in 10 minutes, and has an absolute ceiling of 26,500 feet. The landing speed is 63.4 miles per hour. The span is 31 feet 6 inches and length is 23 feet 1 inch.

The new Hawk makes a striking appearance with its new streamlined landing gear, pants and engine surmounted with a three bladed propeller.

The Conqueror engine with which the plane is powered develops 650 horsepower and the main gasoline tank has a capacity for 50 gallons of gasoline and an auxiliary tank for 50 more gallons.

The landing gear is of the single strut type and a tail wheel has been added to this model which is steerable with the rudder.

### *New Anemometer at Lakehurst*

A SPECIAL high-speed anemometer with recorder mounted on an eighty-foot mast, for obtaining wind conditions over the field, has been placed in operation at the Naval Air Station, Lakehurst, N. J. The mast is of duralumin.

### *Navy Improves Field*

CONTRACT involving a cost of \$2,385 has been awarded by the Navy Department for the improvement of the landing field at the Naval Reserve Aviation Base, Miami, Fla.

## TRADE LITERATURE

### NEW PAMPHLETS AND BOOKS OF INTEREST TO THE AERONAUTICAL INDUSTRY

#### Parker Service Fittings

A CIRCULAR describing the Parker underground service fittings and copper tube was recently prepared by the Parker Appliance Company, Cleveland, Ohio.

#### Ex-Cell-O Boring Machine

THE Ex-Cell-O Aircraft & Tool Corporation, Detroit, Mich., recently published a pamphlet describing and illustrating the Ex-Cell-O Precision Boring Machine, Style No. 112.

#### Parker Bulletins

THREE new loose-leaf bulletins were recently announced by the Parker Appliance Company, Cleveland, Ohio. Bulletin No. 28 describes Parker tube fabrication; No. 29, Parker condensation coils; and No. 32, Parker pad tube couplings.

#### Ex-Cell-O Boring Machine

THE Ex-Cell-O Aircraft & Tool Corporation recently published a catalog, (DB 2131) entitled "Ex-Cell-O Precision Boring Machine." This describes the new device, with detailed illustrations of its parts, and gives an account of various methods of use. Illustrations are of numerous gears, pistons, etc., which can be bored on machines of this type.

#### Chipping Hammers

A LEAFLET concerning their ring valve chipping hammers has been issued by the Chicago Pneumatic Tool Company. The construction of the hammers is illustrated in detail, and specifications of the different sizes included in the line are given.

#### Security Aviation Togs

THIS BULLETIN issued by the Security Sportswear Company of Chicago describes new flying clothes offered by this company. A new two-piece flying suit, which was developed in cooperation with the U. S. Army Air Corps at Dayton, Ohio, is featured.

#### Menasco Motors

MENASCO MOTORS, INC., Los Angeles, California, has issued an engine handbook to serve as a guide in the installation and operation of Menasco engines. A number of diagrams are included. The book is of a convenient size, probably being designed for the pocket of a mechanic's suit, and is nicely bound in black leatherette. Being looseleaf, it may be constantly kept up-to-date.

#### United Air Lines Booklet

UNITED AIR LINES wants air travelers to realize the extensive equipment and exacting service that is in operation when they fly. To this end, the company has pub-

lished an attractive booklet that describes the airplanes used, the facilities, such as radio telephone, weather reporting service and navigational aids, that work for the safety of the passenger. The training of the pilot and ground personnel are stressed and the routes flown by the United Air Lines are described and illustrated.

#### Bastian-Blessing Catalogue

THE BASTIAN-BLESSING COMPANY, Chicago, makers of Rego Welding and cutting equipment, announces the completion of a new catalogue, No. 57, a pocket size booklet of 40 pages. This catalogue is indexed for ready reference and lists specifications and prices of all types of equipment carried by the company. Helpful hints on the use of the tools are included.

#### Teletypewriters

IN "Under One Roof," a recent publication, the American Telephone and Telegraph Company has produced an account of the various industries now utilizing the telephone typewriter for communication between offices located in various parts of the country. Included is a list of various aviation organizations employing this system. The booklet is generously illustrated, showing variations in installations in different types of offices.

#### Taft-Peirce Handbook

A COMPREHENSIVE 216-page handbook for those interested in machine shop practice has just been published by the Taft-Peirce Manufacturing Company of Woonsocket, R. I. The volume is profusely illustrated and replete with data on gages,

small tools, special machines, and machine shop practice. The report of the American Gage Design Committee, with drawings and dimension tables of the standards, is included.

#### The Cincinnati

THE NOVEMBER issue of the Cincinnati, published by the Cincinnati Chamber of Commerce, is devoted to aviation. Articles by a number of leading aviation authorities are included and considerable space is given to airline services operating out of that city. The issue is carefully edited and presents an attractive appearance.

#### Boston Bulletin

THE FORTNIGHTLY review issued by the Civic Bureau and Aviation Bureau of the Boston Chamber of Commerce, dated November 24, carries a special supplement intended to help air passengers select suitable planes and pilots. The limitations of various pilot and plane licenses are pointed out.

#### East Texas

THE East Texas Chamber of Commerce publishes a monthly magazine entitled "East Texas," devoted to activities in and about East Texas. The contents of the July issue included an article on the aviation facilities available in this section of the United States, supplemented with another of aeronautical interest, describing the development of aviation in Houston, Texas. Articles on various phases of aviation in East Texas are included in the contents of this publication from time to time.

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## NEW AERONAUTICAL BOOKS

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### DIESEL REFERENCE GUIDE

By JULIUS ROSBLUM

IN this volume the author has undertaken a complete treatise of the Diesel engine, dealing with both theory and practice. Introducing its work with a brief history of the development of the heavy oil engine, he begins his subject with a discussion of the general scientific principles affecting Diesel operation and then proceeds to develop specific principles of construction and operation. He devotes special chapters to various parts of Diesel systems, such as bearings, supercharging, fuel oil, pumps, oil storage and piping systems.

Other chapters are given over to a discussion of various uses of the Diesel principle, describing its adaptation to horizontal oil engines, electric locomotives, automotive power plants, and aircraft engines.

The volume is voluminously illustrated with photographs, drawing, and charts and contains a number of tables affecting Diesel practice. The author has taken the pains to make the information in this book readily accessible by indexing it carefully.

### PRIZE WINNERS' BOOK OF MODEL AIRPLANES

By CARL H. CLAUDY

IF any of his readers should feel that Carl H. Claudy sinned sins of omission when he included less than a half a dozen descriptions of models to build, in his book *Beginner's Book of Model Airplanes* (reviewed in the December issue of *AERO DIGEST*), they will forgive him fully when they discover *Prize Winners' Book of Model Airplanes*.

This book is a grand assembling of models which have "brought home the bacon" for their builders. Indeed, Mr. Claudy claims himself only the editor of the book, explaining that all the models have been described by the builders themselves, which fact assures their followers an intimate knowledge of the practical problems to be met in their construction.

More than fifty models are described in detail. In addition, the book contains several chapters on model building in general, with many practical hints for readers who take their model building seriously.



# AERONAUTICAL INDUSTRY

## PLANS COMPLETED FOR MIAMI AIR RACES

COMPLETION of the cruise of the United States Amateur Association will be one of the features of the Fourth Annual Miami All American Air Races to be held in Miami January 7-9.

From twenty-five to fifty members, representing various aviation country clubs throughout the country, will fly their planes from New York to Miami, where the winner will be decided on a handicap basis.

Among the participants will be the noted Russian war ace, Major Alexander P. de Seversky and Mrs. Seversky, each of which will fly a plane.

A World War Bird Reunion will be another of the features. Col. William "Bill" Schauffler, Jr., and Lieut. L. C. "Red" Simon will have charge of the American and English pilots. Lieut. Anton Skislewica, formerly of the Austrian Air Service, will have charge of the German and Austrian pilots, and Capt. Robert Morre, formerly of the Lafayette Flying Corps, the French. All pilots of any nationality who were in actual battle duty are requested to write any of the above men, care of the Miami Aviation Department, Miami, Florida.

Major Georges Thenault, Air Attache of the French Embassy, has informed the Race Committee that the Republic of France will give a trophy this year. Major Thenault will fly the trophy to Miami in his personal plane and will make the presentation. The Republic of Mexico is giving a trophy in the form of a silver sombrero.

Competition for the Sir Charles Orr-Bahama Island Trophy, given each year for military formation flying, is expected to be keen this year.

Two races for women are scheduled, one for planes under 500 cubic inches piston displacement and one for larger planes. There will also be daily acrobatic exhibitions by women pilots.

Special races and novelty events will be arranged for pilots who do not place in the money of any of the scheduled events.

### *Space Application Blanks Issued for National Aircraft Show*

APPLICATION blanks for space in the National Aircraft Show of 1932 are in the mails and work on the exposition—aviation's principal exhibition on the 1932 calendar—is under way, William B. Mayo, chief engineer, Ford Motor Company, and chairman of the Show's Board of Control, has announced. The show will be held on Detroit City Airport, April 2-10.

In spite of unfavorable conditions last year, all the exposition's available space was subscribed within the first six weeks, Mr. Mayo said, and it is expected that space will not be available for a longer period this year.

Like the 1931 show, the event will take place in the airport's \$1,000,000 hangar and will be managed by Ray Cooper.

### *Waco Appoints Dealers at Home and in South America*

THE Waco Aircraft Company has appointed a number of new dealers in United States and South America.

Sucesion de Gustavo Landiver, Buenos Aires, Argentina, has been appointed Waco distributor for the Argentine and has purchased a Waco F-2 for use as a demonstrator. This firm is well-known in the Argentine, having been successful distributors for the Packard Motor Car Company for seventeen years.

M. & C. Aviation Company, Saskatoon, Sask., Canada, is a new dealer under J. C. Webster, Jr., the Waco distributor for Saskatchewan and Alberta at Swift Current, Sask.

In the United States new distributors include the Varney Air Service, Ltd., Alameda, California, and Ludington Flying Service, Philadelphia, Pa.

## NEW PUSHER AUTOGIRO SUCCESSFULLY TESTED

ON DECEMBER 15, James W. Johnson, chief test pilot for Buhl Aircraft Company, made successful flights in the first pusher-type autogiro, a two-seater designed by Etienne Dormoy for aerial photography, mapping, observation and sportsmen's uses.

Johnson made his pioneering flight in the early hours of the morning with only J. J. O'Brien, general manager, and a few other company officials present. In the afternoon officials of other companies flew in. These included James G. Ray, vice-president of the Autogiro Company of America, who took the ship aloft after Johnson's initial flights; and A. E. Larsen, chief engineer for the Autogiro Specialties Company.

Noteworthy in the design of the Buhl autogiro is the outrigger tail which eliminates the fuselage. The pilot is seated in the nose of the ship and the passenger under the rotor pylon. By this arrangement the machine is easily trimmed for balance.

The outrigger tail consists of three members of duralumin tubing and completely encloses the propeller, thereby shielding it from unwary bystanders. The gross weight of the pusher is 2,000 pounds and the weight empty is 1,400 pounds. The machine has a rotor diameter of forty-two feet, gasoline capacity of thirty-six gallons, an estimated top speed of ninety-five miles an hour, and is powered with a Continental 165-horsepower air-cooled engine.

### *Stinson Aircraft Corporation Lets Large Contracts for Material*

Material commitments totaling more than \$2,500,000 have been let within the last five days by the Stinson Aircraft Corporation of Wayne, Michigan, it was announced recently. The Stinson Company is a division of the Cord Corp.

In making the announcement, company officials said that Stinson was preparing for an even bigger year in 1932 than in 1931 when the company sold more than 70 per cent of all the cabin planes in the United States and more trimotored planes than all other manufacturers combined.

Revamping of production methods and a general plant expansion, including an investment of many thousands of dollars in new tools and precision instruments will be completed within a few days.

Further expansion is contemplated in erections of new research and experimental laboratories and an improved paint shop.

Capacity production will be started the first of the year with the addition of at least 300 workmen, it was stated.



New two-place pusher Autogiro recently tested by Buhl Aircraft Co.

# DIGEST OF RECENT EVENTS

## A Brief Chronological Summary of the Month's Important Aeronautical News

### French Seaplanes in Pacific

(France.) The first consignment of seaplanes for the French Navy's new base at Saigon in the Pacific was shipped. The planes, intended to guard French shipping interests, are among the first to be stationed by that country in the Pacific. (Nov. 14.)

### Medal for Pacific Fliers

Hugh Herndon, Jr., and Clyde E. Pangborn, who made the first non-stop flight across the Pacific from Japan to the United States, received the White Medal of Merit of the Japanese Imperial Aeronautical Society, in recognition for their flight. (Nov. 20.)

### South American Service

The *American Clipper*, Pan American Airways' new flagship and the largest amphibion, made the first flight over the airway to South America, ending its journey from Miami at Cristobal, Canal Zone. All but the last leg of the flight was flown by Col. Charles A. Lindbergh. Pilot Basil Rowe completed the trip. The *American Clipper* will be used in regular service over this route. (Nov. 23.)

### Eastward South Atlantic Flight

Bert Hinkler made the first west to east crossing of the South Atlantic ocean in the course of a flight from New York to London by way of Jamaica. Using a 120-horsepower Puss Moth, he made the trip to Jamaica in one hop. From Jamaica he flew across the Caribbean Sea to the north coast of South America and then down the east coast to Natal, from where he hopped off across the South Atlantic, landing at Bathurst, British Gambia. His was the first crossing in a light airplane. (Nov. 27.)

### Johnston Trophy Awarded

(New Zealand.) F. C. Chichester of New Zealand was presented with the Johnston Trophy for his flight in the spring of the year to Norfolk and Lord Howe Islands, tiny islands almost five hundred miles distant from New Zealand. His flight was considered a navigational feat. The trophy was founded by the Guild of Air Pilots in memory of the brilliant navigating officer of the airship R 100 and R 101. (Nov. 28.)

### New Rocket Airplane

(East Frisian Islands.) A model rocket airplane of a new type with folding wings flew five miles in a test at Wangerooge, East Frisian Islands. The model was constructed by Reinhold Tiling, German inventor. (Nov. 30.)

### Against Aerial War

(Switzerland.) An international conference opened in Geneva to study juridical means to protect civilian populations from the effects of aerial war. The International Red Cross committee asked the national organizations to send specialists on international law for the discussion. (Dec. 1.)

### Army Conference

The annual Engineering-Supply Conference of the Army Air Corps was held at Wright Field, with an attendance of sixty-five officers. (Dec. 1-4.)

### Record-Breaking Flight

James Wedell made a record-breaking flight from Agua Caliente, Lower California, to Vancouver, B. C., covering the 1,200 miles in six hours and 40 minutes. His time was one hour and eight minutes under the record set several months ago by James Goodwin Hall. Frank Hawks, attempting a record, southbound, over the route the same day, was overcome by monoxide gas fumes and forced to land at Yreka, California. (Dec. 1.)

### Record to Havana

Louis T. Reichers of North Arlington, N. J., flying a Lockheed Sirius, bettered Frank Hawks' record from New York to Havana by eighteen minutes, flying time. He made the flight in six hours forty-five minutes. He carried one passenger. (Dec. 2.)

### Around the World

Mr. and Mrs. Charles Healey Day made on the last part of their flight around the world in their light plane, the *Errant*, flying from Los Angeles to their home in Ridgewood, N. J. They began their trip last summer, going from New York to London by boat, flying thence across Europe and Asia to China. The crossing of the Pacific was made by boat. (Dec. 2.)

### Hinkler Across Africa

(Spain.) Bert Hinkler was continuing his trip from New York to England, after having made the first west-to-east crossing of the Atlantic. From Bathurst he proceeded by way of St. Louis to Cape Juby, Spanish West Africa, to Casablanca, Morocco, and to Madrid. (Dec. 3.)

### Hinkler Completes Flight

(England.) Bert Hinkler landed at Hanworth Airdrome, on the outskirts of London, completing a solo flight from

the United States to England by way of Brazil and Africa. (Dec. 7.)

### Trial Mail Flight

(England.) Imperial Airways made a trial trip over the London-Cape Town airway on a flight to carry Christmas air mails to South Africa. The air mail over this route is to be officially opened January 20. (Dec. 9-20.)

### Trans-Atlantic Airship Service

(England.) Dr. Hugo Eckener, commander of the Graf Zeppelin, conferred with officials of the British Air Ministry in an effort to obtain the use of the Howden and Cardington air stations for a proposed Atlantic service by airship. (Dec. 9.)

### Schiff Trophy

President Hoover presented the Herbert Schiff Memorial Trophy for safe flying to the United States Naval Reserve Aviation Base at Floyd Bennett Field, Brooklyn. The squadron flew 3,441 hours without accident. (Dec. 10.)

### South American Agreement

Pan American Airways signed a preferential agreement with Scadta lines, Columbian airline, and purchased a substantial financial interest in the company. The new agreement eliminates competing and parallel lines near the Canal Zone. Pan American Airways will continue to operate along the coast; Scadta will expand into the interior. (Dec. 13.)

### Air Express Rates Lower

Reduction of air express rates was announced by the Railway Agency and five air transport companies. In some cases the reduction was as high as fifty per cent. Rates were set for 117 cities. (Dec. 15.)

### Australian-London Flight

(England.) Captain Charles E. Kingsford-Smith arrived in London on a flight from Australia in which he picked up en route a half a ton of Australian holiday mail that had been stranded in Malaya through a mishap to the mail plane, the *Southern Sun*. He made the trip in thirteen days, which is a record flight for a commercial plane, in spite of being held back by fog and illness. (Dec. 16.)

### Air Mail Pay

The necessity for a cut of ten per cent in their base pay to meet a deficit of \$600,000 in the air mail service was explained by Postmaster General Brown in a conference of air mail operators. A suggestion from an airline operator to abandon Sunday mail did not meet the approval of the Postmaster General. (Dec. 17.)

## PRICES REDUCED ON STINSON AIRCRAFT

THE Stinson Aircraft Corporation of Wayne, Michigan, a division of the Cord Corporation, experienced in 1931 the most successful year of its history with both gross volume of sales and profits well above any previous figures.

Coincident with this news, the company announced a reduction in the price of its aircraft. In order to accelerate sales and give the retailing industry an early start, the new prices have been made effective immediately rather than waiting for the annual aircraft show. Announcement of the reductions was made by D. B. DeWeese, vice-president and general manager.

The price of the Model "S" four-passenger cabin monoplane powered with a 215-horsepower Lycoming engine is reduced from \$4,995 to \$4,595. The Model "T" ten-passenger trimotored airliner is reduced from \$25,000 to \$19,500.

In further preparation for 1932 sales, the corporation had a private pre-showing of its Model "R" DeLuxe four-passenger cabin monoplane to executives during December and will hold another for dealers in January.

In discussing the problem of reducing the cost of airplanes, DeWeese pointed out the importance of economical distribution, and expressed an opinion that the most valuable sales medium is the flying field operator.

"The men who are operating the hundreds of fields throughout the country," DeWeese said, "are our only means of selling airplanes to the public unless we go into a more expensive subsidiary sales and service branch system of our own."

DeWeese believes that the manufacturer should assist the flying field operator who is trying to distribute aircraft. "For the past two years, the flying field man has had tough going. His hangar may be filled with planes in dead storage; he cannot sell gas, oil, or repairs to these owners. He used to make good money on air taxi work but this business has fallen off and rates have been cut below cost. His repair business has decreased due to the development of better airplanes and decreased flying per plane during the past year. He has been able to sell only a few planes per year. Therefore, he needs more capital as well as new enthusiasm to enable him to 'come back' to share in the better times which are just ahead."

### Engineers Have Banquet

JOHN N. WILLYS, United States Ambassador to Poland, will be the speaker at the Annual Dinner of the Society of Automotive Engineers, to be held in the ball room of the Pennsylvania Hotel, New York City, Jan. 14, 1932, according to a statement from the S. A. E. headquarters.

This banquet, which is an annual event, is the chief social function on the calendar of the Society of Automotive Engineers.

## COMING AERONAUTICAL EVENTS

January 3-7. New York to Miami Amateur Cruising Race under the auspices of the United States Amateur Air Pilots Association.

January 7-9. Miami All American Air Races, Miami, Florida.

January 11. Florida State Air Tour will leave Miami, on a ten-day tour of the State. Tour is by invitation.

January 14. Annual Dinner of the Society of Automotive Engineers in the ball room of the Pennsylvania Hotel, New York City.

January 25-29. S. A. E. annual meeting program, at the Book-Cadillac Hotel, Detroit, Mich.

February 23. A meeting under the auspices of the Daniel Guggenheim Fund Committee on elementary and secondary aeronautical education. 2:15 p. m. at the Hotel Washington, Washington, D. C.

April 2-10. National Aircraft Show of 1932, sponsored by the Aeronautical Chamber of Commerce of America, Inc., in the Expositions Hangar, City Airport, Detroit, Mich.

November, 1932. The thirteenth aeronautical exhibition, organized by the Syndical Chamber, will be held in the Grand Palais, Paris.

### Aeronautical Sales Held Up Well During First Nine Months of 1931

Reports from more than fifty airplane manufacturers and eighteen airplane engine producers during the first nine months of 1931, show that the cumulative total value of commercial and military engine sales were only \$2,500,000 less than during the same period of 1930.

Total deliveries (sales) valued at \$27,971,888 were reported during the first three quarters of the current year, as compared with \$30,530,246 in 1930. Production of airplanes and engines in 1931 totaled \$26,606,192 as compared with \$29,419,466 during the first three quarters of 1930—a drop of about \$3,000,000.

Production of commercial airplanes in the nine month period of 1931 totaled 1411 units valued at \$5,748,080, while 1671 units valued at \$9,201,270 were reported in 1930. Deliveries up to October, 1931 totaled 1419 units valued at \$6,455,763 as compared with 1967 units with a value of \$9,691,334 in 1930.

During the first three quarters of 1931, 1743 commercial engines were produced at a value of \$3,422,651.

## BOEING CO. HAS PROFITABLE YEAR

CONSIDERABLE activity was reported by the Boeing Airplane Company for the year just concluded and production marked it as one of the most prosperous years in the company's history.

During 1931 the Boeing plant completed and delivered 125 Army Wasp-powered pursuit planes, forty-seven Wasp-powered Navy fighters, two new-type Army monoplane bombers, twelve four-passenger mail planes and two new-type passenger-cargo monoplanes, in addition to experimental construction work.

Steady increase of production at the Boeing plant characterized the last few months of 1931 and at the close of the year the Boeing factory was employing approximately 1,100 men, more than had been on the payroll for twenty months. With the plant running at full speed, deliveries are to be made during the first few months of 1932 on seventy-five Army pursuit planes, seventy-four Navy fighters and five Army bombers. These planes were contracted for in 1931 by the Army and Navy.

The present production program alone will keep the Boeing plant at its present peak for the next five months.

### High Temperature Cooling Studied

RESEARCH into high temperature liquid cooling systems for aircraft engines is being conducted by the Michigan College of Mining and Technology mechanical engineering department under the direction of H. W. Risteen, recently appointed assistant professor in that department. Professor Risteen, who has published A. E. L. report 232 on the research subject mentioned, gained his laboratory experience in the aeronautical testing division of the Naval Aircraft factory at the Philadelphia Navy yard, and as experimental engineer with the Comet Engine Corporation of Madison, Wisconsin.

### Boeing School Offers Business Courses

INCREASING importance of business methods peculiar to air transportation has led to emphasis by the Boeing School of Aeronautics, Oakland, Calif., upon courses treating with accounting and business methods. Cyril Thompson, registrar for the Boeing School, has developed and is presenting courses covering business and air law. Refinite problems involving use of operations, inspection, stock supply equipment log, traffic and mail forms are given to students, who are required to do sufficient work on air transport accounts and financial statements that they may appreciate the problems of air transport management.

Practical experience in this phase of aeronautical instruction is afforded Boeing School students through an arrangement with a local air transport company whereby students gain advanced training under actual working conditions.

## A.S.M.E. Holds Meeting

DURING the Fifty-Second Annual Meeting of the American Society of Mechanical Engineers in New York, November 30 to December 4, a session was held under the auspices of the Aeronautic Division of the Society with the cooperation of the American Institute of Physics. A paper entitled "A Study of Light Signals in Aviation and Navigation" was presented by I. Langmuir, associate director, Research Laboratory, and W. F. Westendorp, Research Laboratory, General Electric Company.

W. B. Heinz, General Electric Company, presented a paper dealing with the design problems of controllable-pitch propellers. Professor A. Klemin, New York University, read written discussions of this paper, which were sent in by F. E. Weicks of the N. A. C. A., and F. W. Caldwell of the Hamilton Standard Propeller Corporation, and added a discussion of his own. This was followed by a review of aeronautic progress, and the Progress Report of the Aeronautic Division, presented by Elmer A. Sperry, Jr., of the Sperry Gyroscope Company.

### Bradley Plane Chute Tested

THE Bradley Parachute Ejecting Apparatus, designed to lower a plane by parachute, which has been in the experimental stage for a number of years, was given a final test at the St. Charles, Illinois, Airport recently.

The device consists of compressed air apparatus for ejecting the parachutes from two aluminum tubes streamlined at the front. The chutes used are of Irving construction, each forty-five feet in diameter, attached to the top center section of the ship.

In the test, the pilot released the compressed air with seventy pounds pressure. The pilot chutes opened quickly, followed by the main parachutes and the ship descended at a speed of approximately eight feet per second. The use of two chutes reduced the oscillation to a minimum.

### Stanavo Announces New Gasoline

THE Stanavo Specification Board of the Standard Oil Company of New Jersey has announced the discovery of a new gasoline with a flash point comparable to that of the furnace oil used in Diesel engines. Other advantages are an increase in power, this fuel affording about ten per cent more power than high test gasoline, and a reduction in the cylinder head temperatures.

### Eight Air Decisions In Third Quarter

EIGHT decisions pertaining to problems of aeronautical law were handed down by State and Federal courts during the third quarter, including in subjects covered con-

stitutional law, contracts, sales, torts, taxation, insurance and workmen's compensation. A reversal of previous favorable decisions, handed down by Oklahoma and New Mexico Federal district courts, was made by a Federal statutory court for the Eastern District in deciding a tax upon the sale of gasoline to be used in interstate air transport to be valid. The question will probably be finally settled soon in the Supreme Court.

### S.A.E. to Hold Annual Meeting

THE Society of Automotive Engineers will hold its annual meeting program on January 25-29 at the Book-Cadillac Hotel, Detroit, Mich.

Among the papers of interest to the aeronautical industry to be read are: Theory of Internal Combustion Engines and Fuels by H. L. Horning; Research Instruments, Demonstration by T. O. Richards; A Possible Criterion for Bearing-Temperature Stresses, D. P. Barnard.

### Dr. Arnstein to Study German Ships

DR. KARL ARNSTEIN, vice president and chief engineer of the Goodyear-Zeppelin Corporation, sailed from New York in December for Germany.

Landing at Hamburg, Germany, Dr. Arnstein will go to Friedrichshafen, where he will discuss airship problems and learn about the plans of Luftschiffbau-Zeppelin in connection with that company's new ship, LZ-129, which it is building for trans-Atlantic commercial service.



(P. & A. Photo)

Mr. and Mrs. Charles Healey Day of Ridge-wood, N. J., who recently returned from a trip around the world by boat and plane.

## Women Organize Society

THE British Women's Engineering Society has formed a special Aeronautical Section at the suggestion of Lady Bailey, which will work for the opening up of the more technical side of aviation to women. In spite of the fact that women have proved themselves capable and efficient in the air, it is still very difficult, especially in England, for a woman to obtain training in technical aeronautical work, and when obtained, the training has been expensive, and in some cases, not satisfactory. The Society hopes not only to help women in obtaining training, but also to assist them in securing posts.

While organized in England, the Society membership includes many women engineers in other countries. Further details regarding membership in the Aeronautical Section and the work to be carried on by this section, may be obtained from Elsa Gardner, Contributing Editor of AERO DIGEST, who is a member of the Society's Council.

### State Air Officials Organize

AN ORGANIZATION of state officials charged with carrying out the aeronautical laws of the states was effected on December 3-5, when officers were elected in a business session at East St. Louis, Ill. The purpose of the association is to promote uniformity and stimulate state aid of aviation.

### F. C. Hall to Offer Award for Pilots

THE "working men of the air," line mail and passenger pilots who make commercial aviation possible, are to receive national recognition under plans announced November 19 by F. C. Hall, of Oklahoma City, backer of the Post-Gatty round-the-world flight, for formation of the "Legion of Veteran Airmen," with an annual "Hall award."

Holding that stunt flights are becoming passe and public attention is awakening to the merit of the everyday pilot, Hall has drawn plans for a ten-year program, during which he hopes to create an annuity to perpetuate the award and legion.

The award will consist of a metal designation and cash prize to the pilot chosen and a trophy to his company, the latter to be retained by the company.

### Rinehart Develops Wing Flap

DEVELOPMENT of a wing flap for air-planes which will reduce the landing speed of a plane from 65 to 25 miles an hour and which will aid in the lifting capacity and take-off ability, has been announced by Howard M. Rinehart, Dayton (Ohio) aircraft engineer. The flaps, placed on the under side of the plane wing are operated from the cockpit. License to use the flaps on experimental planes has already been granted the Sikorsky Aviation Corp., and the General Aviation Corp.

## NORTHEAST

EX-CELL-O Aircraft & Tool Corporation of Detroit, Mich., has announced the appointment of Fred D. Hassler, Memphis, Tenn., as manufacturer's representative handling the complete line of Ex-Cell-O products. He has been assigned the exclusive territory of Tennessee, Arkansas, Mississippi and Louisiana.

THE election of James M. Eaton, of New York, as president of the Ludington Airlines to succeed Nicholas S. Ludington, was recently announced by directors.

Ludington will, however, remain president of the Ludington Corporation, which owns and controls the airline.

Eaton was general traffic manager for Pan American Airways for more than three years, having joined that company in 1928.

MARVIN H. SCARBOROUGH, sixty, of Philadelphia, recently passed tests for a private pilot's license. Scarborough, who is believed to be one of the oldest student pilots in the country, has an Aerona which he uses for pleasure flying.

IMPROVEMENTS being made at Central Airport, Camden, N. J., are expected to keep two hundred men employed for most of the winter months.

The present plans, which are near completion, call for a lengthening of the present runways to an average of 2500 feet, widening to 150 feet, grading and smoothing the inclosed triangle formed by the runways, and treating the entire surface with asphaltic oils.

The fence at the airport at present encloses 192 acres. With the completion of present plans, 28 acres, in triangular form, will be added to the size of the port.

New equipment of the airport is a 5,000,000 candlepower floodlight, which will illuminate the entire field for night flying.

THE RISING SUN AIRPORT, INC., was recently organized at Philadelphia by Fred and George Zilsneier. They are operating a flying service from a field located on Red Lion Road near the Roosevelt Boulevard.

Fourteen ships are stored in a hangar which has been built at the field.

TRANSPORT service and night flying at Pittsburgh's new city-county airport are expected to get underway in January. The MacNeil Electric Company, contractors for the lighting, expected to complete their work by the first of the year if weather permitted.

Surface paving has been completed. Daylight flying is being permitted but no transport operations, except in emergencies, has been allowed until lighting has been completed for night work.

ALTHOUGH suspension of air mail service at Utica (N. Y.) Municipal Airport November 15 was threatened by the Post Office Department unless assurance was given by the city that snow would not be allowed to clog the field, a condition which brought suspension of service last year, service still is continuing.

Superintendent of Public Works Charles A. McKernan has proposed that Utica unemployed be used to keep the airport open, and this plan met approval in the city. The Post Office Department, however, expressed its skepticism as to the success of the plan, and said that service may yet be suspended if the field reaches a dangerous condition.

AN UNUSUAL exhibit of scale reproductions of famous airplanes was held recently in New York City by Noel H. Poirier of the Poirier Aircraft Model Co., East Hartford, Conn.

The company is now engaged in constructing a ten-foot model of *The American Clipper*, Sikorsky S-40, owned by Pan American Airways, and several large Ford trimotors.

Poirier has been building models for ten years and has built models now on exhibit at the Smithsonian Institute and other museums with aircraft exhibits.

The Queens Unit No. 1, of the National Aviation Reserve, made a trip of inspection recently to the Curtiss-Wright Airport at Valley Stream, L. I., being guests of the Curtiss-Wright Flying Service.

The Unit was taken out from Jamaica to the field in a special bus.

While at the flying field the young men obtained the "feel of the air." This supplemented the lectures in ground school work which are being conducted weekly in the Town Hall, Jamaica, N. Y.

SEYMOUR FIELD, at Little Falls, (N. Y.) is to be enlarged. Plans are underway to widen the airport and to arch the creek on the west side.

DEPARTMENT OF COMMERCE engineers who recently visited Canajoharie, (N. Y.) are reported to have taken a 10-year lease at \$10 per acre on the farms of Mrs. Etta Garlock and Mrs. Silas Bowerman, 4½ miles southwest of the village. The former farm contains 100 acres and the latter 30. An emergency airport will be prepared here.

GLIDING experts from all parts of New England gathered in Providence on Dec. 12 and organized the New England Glider Association. Arthur L. Lawrence of Providence, organizer of the association, was elected the first president. Dana L. Darling of Greenfield was elected vice-president. Mr. Lawrence will serve as manager and treasurer.

The president outlined the proposed program to have the organization act as a

mother unit for the individual clubs and private owners of the New England states. An annual fee of \$2 will be levied on all clubs applying for membership, to bear expenses of the association. An executive committee was appointed to prepare by-laws and a constitution.

The following clubs were represented at the session: Glider Section, Rhode Island Aviation League; Franklin Glider Club, Gardner Glider Club, South Shore Glider Club, Quincy Glider Club, Cape Ann Glider Club, Hyde Park Glider Club, Hyannis Glider Club, South Natick Glider Club and the Kenwaydin Glider Club.

THE Curtiss-Essex Airport at Caldwell, N. J., is conducting a primary ground school holding classes at the Paterson YMCA two nights a week. This class has sixteen members. An advanced ground school with eight members is conducted at the airport two nights a week. Another primary course was recently established at Hadley Field under Curtiss-Wright supervision. There are eighteen pupils enrolled in this class.

The Curtiss-Essex Airport also plans to start a course in radio and parachute rigging, provided enough interest is found to exist.

An indication of the activity to be found at this airport is the fact that on the average Sunday about two hundred pay passengers are carried aloft on short hops.

THE Watertown senior high school, Watertown, Mass., has an active aviation club, which has just completed the construction of a Northrop training glider. The whole club is attending ground school lessons, given by Frank O'Connor, an authorized ground school instructor.

The officers are H. Eisenhour, faculty advisor; Stanley Drinkwater, president; Alfred Beninatti, secretary treasurer.

THE Stamford Gliding Club, Stamford, Conn., has made successful tests of its newly constructed Mead Glider, and has decided upon the organization of a second flight group to construct another glider.

The membership of the club is rapidly increasing and has more than doubled in the past two months. The aims of the club are to introduce an aeronautics course in the Stamford high school; to aid in obtaining a city airport; and the encouragement of motorless flying.

C. M. KEYS, chairman of the board of Transcontinental & Western Air, Inc., announced recently, that at a meeting of the board of directors E. R. Stettinius had been elected a director and member of the executive committee of the air transport line which operates passenger, air mail and express service between New York, Los Angeles and San Francisco, with a spur line between Columbus, O., and Chicago. Mr. Stettinius is vice president of General Motors Corporation.

THE Truscon Steel Company has taken over the Berger Manufacturing Company Building Products Division at Canton, Ohio, and will continue to operate it as Berger Building Products Division of the Truscon Steel Company, continuing with Berger's present policies and retaining on their staff their present selling organization.

MARTIN & ULRICH, INC., insurance brokers of New York City, have announced the election of Ashley C. McKinley as vice president. Mr. McKinley was third-in-command in the Byrd Expedition to the Antarctic.

THOMPSON AERONAUTICAL CORPORATION, Cleveland, Ohio, controlling Transamerican Airlines Corporation, announces through its president, R. C. Marshall, the election of a new secretary and treasurer, and important personnel changes affecting its air transport, sales and services divisions.

A. W. McCann, of New York City, prominently identified with eastern aeronautical activities since 1918, has become secretary and treasurer, succeeding W. E. Close, of Cleveland, who resigned because of the pressure of outside business interests.

John L. Ruden, operations manager of Thompson Aeronautical Corporation since early in 1928, has been placed in charge of its entire sales and service organization, and also will supervise the operations and traffic departments of its transport division.

P. A. Wright, of Cleveland, sales manager for Thompson Aeronautical Corporation since early in 1929, was named assistant to the president. William L. Jenks, also of Cleveland, purchasing agent for the Corporation's sales and service units, was appointed sales manager, retaining his original duties, and transferred to Detroit, Mich.

CHICAGO Pneumatic Tool Company, New York, has announced the removal of their office and service station at Seattle, Wash., from 1743 First Avenue South to 3201 First Avenue South and the appointment of Mr. C. Kirk Hillman as district manager. The new quarters are larger and permit carrying a complete stock of repair parts as well as representative items of the company's various products, which include air compressors, pneumatic tools, rock drills, electric tools, Diesel engines, etc.

THE Aeronautics Branch, Department of Commerce, is now at work straightening out the airway markers to Central Airport. The beacons had been arranged to lead air traffic to the Philadelphia Airport.

RICHARD W. ROBBINS has been elected president of Transcontinental & Western Air, Inc.

In October, 1930, Mr. Robbins was elected a director and member of the Executive Committee of T. & W. A. and upon

the resignation of Mr. Hanslue as president, in July, 1931, he became managing director of T. & W. A.

## SOUTHEAST

LOUIS M. RAWLINS, electrical and aviation engineer, has been appointed city airport manager of Baltimore, preparatory to improving Logan Field at that city. He will begin at once a survey of the field and draw up a list of recommendations for improvement.

It is the object of the city to make Logan Field, which is being used as a temporary airport, as satisfactory as possible at the least possible cost. Removal of hazards and improvement of ground conditions are to be the chief alterations.

DREDGES are at work removing sediment from the harbor here and using it to elevate the municipal airport.

MIAMI will lease one-fifth of the Dinner Key seaplane base from Pan American Airways for five years and sub-let the area to the United States Coast Guard for an aviation patrol for protection of yachts quartered there in the winter.

THE City Commissioners have authorized the purchase of 30 acres of land adjacent to the Municipal Airport and the erection of a \$3,500 steel hangar. The city engineer will have plans ready for bids in about four weeks.

THE county commissioners have authorized the construction of a hangar at Redfern Field on St. Simons so that the airport can be used and a passenger mail route secured.

The field is an emergency field on the Richmond-Jacksonville route.

THE city commissioners voted to grant a five-year lease on a municipally owned tract of land to the American Eagle Aircraft Company under the provision that the company start construction within six months on a plant to employ 300 men.

THE Florida road department will begin work on emergency landing fields Jan. 1. A law was enacted empowering the department to spend \$25,000 a year on such construction. The funds are derived from the tax on gasoline.

The fields will be state property or on land donated by citizens. All fields will be 10 miles or more from the limits of any town or city.

HARRY D. DENEGRE, a licensed pilot of all types of aircraft and construction supervisor for balloons and dirigibles built in the United States for the allied armies during the World War, was appointed

superintendent of the Tampa airport by Mayor Chancey recently to fill the vacancy caused by the resignation of I. G. Hedrick, who has managed the field since February, 1930.

THE two leading schools of Birmingham, the Birmingham Air Service and the Birmingham Flying Service, Inc., have merged forming a \$25,000 corporation.

A branch of the school is to be opened at Gadsden some time after the dedication of the port there. A branch is already in operation at Tuscaloosa, Ala.

DEDICATION of a new airport at Gadsden, Ala., was held recently. The port was developed by the Gulf States Steel Company and although the field is privately owned it will be open to the public at any time.

The field is 45 acres and has two runways 160 feet each. Clearance at each end will give 2,500 feet for take-offs. Each runway is 100 feet wide.

NASHVILLE, TENN., is likely to be dropped from air mail service unless the city improves the municipal airport at the field, city officials have been advised by government officials and the American Airways.

Longer runways are needed badly at the field, they said.

THE Cumberland Aeronautics Corporation has been organized with a capitalization of \$50,000. The concern, whose offices are in the Law Building, Cumberland, Md., will deal in airplanes. Its organizers are T. Brooke Whiting, Clarence P. Fletcher and Fuller Bainard, Jr.

ARTHUR HARRIS, of Rock Hall, Md., well-known aviator of Kent County, has demonstrated a new use for airplanes. He has discovered that oyster beds can be located from an airplane. Although oysters cannot be detected from the surface of the water, it has been shown by the aviator that they may be easily seen from the air, the water acting as a huge magnifying glass through which oyster beds appear greatly enlarged and easily visible at the bottom of the bay. Many oysterman have taken flights and located oyster beds from which they made fine catches.

RUSS BRINKLEY, billed as "Skyball—the Flying Joker," has joined the staff of Famous Fliers, Inc., headed by Leo J. Sauerborn and will act as announcer and master of ceremonies during the New Orleans Air Show, preceding the Mardi Gras. Brinkley will also announce the Miami Air Races and Florida State Air Tour.

NIGHT service is scheduled to get underway in the South by American Airways in about six months, according to Frederic Coburn, president, who was at Memphis recently. The Nashville-Dallas section will

be lighted by Spring, he said, and the Louisville-Nashville section is being extended.

When facilities for night flying are completed service will extend from Memphis, and Little Rock to Forth Worth.

ELLING O. WEEKS of the Weeks Aircraft Corp., Milwaukee, has announced the appointment of John Payne, Charlotte, N. C., as distributor in that section for the products of the Col-Gra Co., also a Milwaukee firm. Col-Gra manufactures a colloidal graphite, a material added to lubricants for automobiles and airplanes to produce greater smoothness and efficiency.

LIEUT. COMMANDER W. M. Dillon, of the naval bureau of aeronautics, reports that 75 to 100 naval airplanes would participate in Miami's 1932 All-American air meet, to be held in January.

The airplane carrier Langley will dock at Miami as a base for 45 of the planes. The Wright will dock at Port Everglades as a base for 24 planes.

THE SECOND of six new hangars for Pan American Airways at the marine base at Dinner Key has been started. It will be of steel and concrete construction, 140 by 140 feet, costing about \$60,000.

Fred J. Gelhaus, division airport engineer for the company, is in charge of the construction.

SMOKE from forest fires which have been raging with varying intensity for several weeks past has added another hazard to those experienced by night air mail pilots flying to and from Candler Field, at Atlanta.

Palls of smoke are encountered from 100 to 6,000 feet up, and are as bad as fog, according to Usher Rousch, a pilot flying between Atlanta and Chicago. Conditions were made worse by moonlight. In one case a pilot was forced to fly for thirty minutes with only his instruments to guide him.

VERNON Campbell, Byron Arkebaour, Dick McKercher and Thomas Quimby, all of Tampa, Fla., recently organized a glider club.

## NORTH CENTRAL

THE ARCO COMPANY, manufacturers of paints, varnishes, enamels and lacquers, with general offices at Cleveland, Ohio, has announced the appointment of Philip L. Maury as president. S. D. Wise, president, and S. D. Weil, vice president, are retiring. Mr. Maury has had long experience in the paint industry, having held executive positions with the Sherwin-Williams Company, the Detroit Graphite Company, and Valentine & Company.

THE Holterhoff Flying Service, Inc., Brown Deer, has taken a lease on the Cream City Aircraft hangar at the Milwaukee county airport and will establish a service station, school branch and sales agency there. Fritz Holterhoff, vice-president, has named Carl C. Koeffler, a private pilot and national outboard motor boat racing champion of 1929, as president and Nolan Kenney as secretary-treasurer. Holterhoff will continue as chief pilot with Garth Smith as assistant instructor. Lester Ball, World war aviation mechanic, has been placed in charge of the service department. The concern will continue to operate its airfield at Brown Deer in addition to the station at the county airport.

A NEW airplane hangar has been constructed at the Menominee county airport by Earl Gustafson of Marinette and Alfred Bretl, Menominee. The new hangar is 50 feet square and will accommodate four planes.

CITIZENS of three villages in Illinois and Indiana plan to petition for a hero's medal for Pilot M. D. (Doc) Ator, of the American Airways system, for saving eight lives and the village of Wallace, Indiana, from destruction by fire in the last six months.

Early in the morning of May 9 Ator, while flying the Chicago-Atlanta mail, aroused the occupants of a burning house in Centralia, Illinois.

Next he discovered a brush and grass fire advancing upon the village of Wallace, Indiana, on the night of August 1. Ator's most recent rescue was on the night of October 29 when he detected a fire on a farm near Lowell, Indiana.

FREE, round-trip airplane passage from Detroit to Kansas City for the June convention of the Hotel Greeters Association of America will be awarded to the two members of the Ladies' Auxiliary securing the most new members before January, it was announced recently.

Century Air Lines trimotor planes will carry the winners via Chicago to St. Louis where they will board a Braniff Airways plane for Kansas City.

The same award will be posted for a membership contest to be sponsored by the Men's Auxiliary of the Association shortly before the convention, the announcement read.

MAYOR PARKER L. CROUCH has announced that he would propose to the council issuance of \$100,000 of the \$200,000 in bonds authorized by the voters for purchase and construction of an airport at Des Moines, Iowa. Of this sum \$20,000 will be made available for employment of men out of work to move the hangar from the present airport just off Highway No. 32 east of Des Moines and to build temporary run-

ways before the ground becomes too hard to work on.

DES MOINES recently purchased a 160-acre tract for a municipal airport.

The price agreed upon between Truman Jones, owner, and the city, was \$80,000. This figure is \$15,000 more than the award made by a jury in condemnation proceedings.

INCREASING patronage of air transportation by large corporations has been recorded by United Air Lines as a result of a questionnaire returned by 784 firms capitalized in excess of \$100,000. Of this number, seventy per cent reported that they find the need for air travel in business increasing, and sixty-five per cent of these firms stated that their executives and representatives are traveling by air, the average number for each firm being four. Of the various sections of the country represented, Western states showed a larger percentage of executives traveling than did the Middle-West. Representation by departments listed by the 784 firms for air travel were, in order, executives, sales, traffic, service, inspection and engineering. The questionnaire shows larger use of airplanes by business firms than a year ago.

WILLIS C. BROWN has resigned as director of sales and service for Continental Aircraft Engine Company, Detroit, Mich., the company recently announced. Mr. Brown will organize the Willis C. Brown Company, of Tulsa, Okla., for the sale of Continental industrial engines and certain electrical and mechanical specialties for the oil fields.

NOTICES have been sent out by the Fremont, Neb., Chamber of Commerce, that Fremont's airport, on the Reynolds Farm north of the city limits, is ready for use. The field has been leveled and is said to be in good condition. A wind indicator and sign marking the field have been installed.

WALTER R. BULLOCK, former chief pilot, has succeeded the late Chadwick B. Smith as the operations manager of the Northwest Airways, Inc.

THE OMAHA, Neb., air races of 1932 will be a four-day event, from May 27 to May 30, it was announced following the annual meeting of the Omaha Air Race Association, non-profit corporation sponsored by the Omaha Junior Chamber of Commerce. Officers and directors were re-elected at the meeting.

J. REED, owner of the Lawton Flying Service and lease-holder of the Lawton Municipal Airport, has purchased the Texas-Oklahoma Airlines from Robert Tarbutton, veteran Oklahoma pilot. Tarbutton will reopen the Southwestern Flying Service in

Oklahoma City, Okla. Reed will operate two Travel Air cabin planes from Oklahoma City to Wichita Falls, Texas, on a twice-a-day schedule, making Lawton a key stop on the line.

C. A. DONNELL, of the Oklahoma City weather bureau, has been named Federal weather meteorologist serving the airline companies operating off the municipal airport. A weather observation laboratory will be set up in the tower of the new municipal airport administration building.

## SOUTH CENTRAL

DR. ROY FISHER of Frederick, Oklahoma, who is the only general surgeon in Oklahoma who is a Government Licensed Pilot has been appointed State Flight Surgeon under the recent State Aviation Law. Dr. Fisher is also a designated examiner for the Aeronautical branch of the Department of Commerce.

TWO moves were made at Tulsa, Okla., recently to further Tulsa's claim as the aviation center of the mid-continent area.

McIntyre and Garland airports, representing an outlay of approximately \$350,000 were merged into the McIntyre Airport Co. All properties will be concentrated on the Garland airport southeast of the city and the old McIntyre airport, Tulsa's pioneer flying field, will be abandoned.

At the same time, A. L. McQuiston, former meteorologist for the now abandoned Safeway Airlines and later municipal airport weather observer, announced plans to reopen the old Collier-Wilcox airport, east of the city, under the name of Magic City airport.

OKLAHOMA CITY gained its second direct airline connection with Omaha, Neb., November 5, when the Braniff Airways, Inc., inaugurated consolidated schedules with the Rapid Air Transport out of Kansas City, Mo.

Under the new schedule, Omaha passengers will leave Oklahoma City over the Braniff lines at noon arriving in Omaha at 4:40 o'clock the same afternoon.

W. E. FLETCHER, manager of the Oklahoma City municipal airport in South-West Park, was named manager of the new Oklahoma City municipal air terminal, A. R. Losh, city manager, announced November 3. Fletcher took charge of the airport at once, but he will not be placed on the pay roll as manager until the port is completed, Losh said.

AN inter-airport airplane service has been started between Lambert-St. Louis Field, in St. Louis County, and Curtiss-Steinberg Airport, south of East St. Louis, for the convenience of passengers changing airlines at the St. Louis terminal.

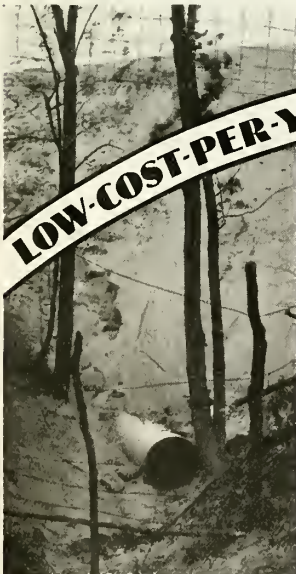
The operator is Virgil Fitcher, a gradu-

ate of Parks Air College. Fitcher is using a Stinson Junior operating on a schedule to conform with arrivals and departures of planes of Century, Robertson, American Airways, and Transcontinental.

The Universal Division of American Airways carried 900 revenue passengers and 29,000 pounds of mail during October. The entire American Airways system carried 4,137 passengers and 97,000 pounds of mail.

THE Edwards & Minter Flying Service has been appointed California state distributors by the Nicholas-Beazley Airplane Company, Inc., of Marshall, Missouri. This is a new organization headed by A. J. Edwards, former official of the Ryan Airplane Company at San Diego, later associated with other aviation manufacturing companies in an executive capacity, and Clarence E. Minter. This new organization located at Inglewood, Calif., has taken delivery of two Nicholas-Beazley NB-8G's.

THE Spartan School of Aeronautics has recently established full courses in flying and aviation mechanics at the Oklahoma Military Academy at Claremore, making it possible for high school seniors to enter the Oklahoma Military Academy, to complete their junior college work of two years, and to be graduated as full fledged transport pilots. Aviation cadets must carry at least three academic subjects in addition to their



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flying courses, and must maintain a passing average in all work in order to continue in school. This rule has been made with the object of helping the prospective flier to be better prepared to enter life's work as a producer, when he has completed the high school or junior college departments of the academy.

The costs of the courses have been made as low as the standard of the aviation industry will permit.

CITY COUNCIL of Austin, Texas, has voted to purchase and install weather bureau equipment in the administration building at Robert Mueller municipal airport at a cost of \$219. The council also appropriated \$2,217.60 to build a graveled runway between the new hangar and the present graveled taxi-way. Contract for the construction of the hangar was awarded recently to Heierman-Tips of Austin at a cost of approximately \$6,900.

NIGHT flying equipment and radio receiving sets were installed on all planes belonging to Braniff Airways, Inc., during November, according to Ray Shrader, operations manager. Radios will furnish pilots with reports of weather conditions into which they are flying but will not permit transmitting.

PLANS for a hangar and administration building at the new Beaumont, Texas, municipal airport near Amelia have been submitted to city officials, and bids for the construction will be asked shortly. The administration building will be a two-story structure, and the hangar will be sufficiently large to accommodate 10 or 12 planes.

FLYING operations were begun November 16 by the army's newest tactical organization, the Twelfth Observation group, formed at Brooks Field, Texas, as the Primary Flying school was moved to Randolph Field.

About 50 flying officers, most of them comparatively recent graduates of Kelly field, started training.

The observation group is composed of the Twelfth, Twenty-second and Eighty-eighth Observation squadrons, Sixty-second Service squadron and First Photo Section. The Fifty-eighth Service squadron is stationed temporarily at the field, bringing the total enlisted strength to about 800.

TEXAS AIR TECH, an offspring of the Cycloplane Company, Ltd., of Los Angeles, has been established at Curtiss-Wright Flying Field, Grand Prairie, Texas, under the direction of N. P. Peabody, president. Two types of machines are used, the ground trainer and the cycloplane. Three steps are included in the curriculum, first learning the rudiments of flying without ever leaving the

ground, then making hops of fifty yards at an altitude of eighteen inches and finally doing real flying at greater heights and distances.

COMPLETE equipment for air radio instruction, including a short wave radio broadcasting station and receiving sets in planes, has been installed and classes in radio work have started functioning, it is announced by officials of the Dallas Aviation School at Love Field, Dallas.

Two courses are offered, the one to prepare the student for the Government third-grade license and the other to prepare him for the second grade license. The first grade license is obtainable only after eighteen months' actual experience, and no further instruction is necessary to procure this.

AIRPORT facilities are now available at Brownwood, Texas. The Brownwood Flying Service, with C. B. Shropshire, manager, and Lea Abbott, transport pilot, has charge of the new municipal airport.

An all steel fireproof hangar that will house five planes has been constructed. Two runways have been graded and a third is under construction.

The Brownwood Flying Club is operating from this field.

THE OKLAHOMA CITY, Okla., municipal air terminal probably will be placed in operation about Christmas, with a big flying circus to be held in the spring to mark the formal opening, it was recently reported.

The opening was originally set for November 14-15, but when it became apparent that the port would not be in condition by that time, the date was cancelled.

The port has been used by planes, but all facilities are not ready.

Plans for further development, particularly lighting, building additional runways and a municipal hangar, and fencing the tract are being held up until the arrival of a Government inspector to check plans.

THE CITY OF MOBILE, Ala., has issued and sold bonds for extensive expansion and improvement of Bates Field, the municipal airport. Both the surface of the flying field and the general equipment will be greatly improved by the airport program. The field is to be enlarged to provide 2,600-foot take-offs in each direction and is to receive further grading and drainage work. A system of field lights meeting the requirements for an "A" rating will be installed.

The present hangar is to be replaced by a new one of brick and steel construction, consisting of a 120-foot span and an eighteen-foot clearance. A new and much larger administration building is included in the improvement program. This structure will contain a lobby, sleeping rooms, baths, pi-

lots' room, a first aid room, administrative offices, quarters for a weather service station and other facilities.

The plans provide for construction of concrete taxi-ways and aprons, field fencing and underground installation of all wires leading to the field.

It is estimated that approximately three months will be required to complete the improvements.

A SOCIAL organization has been formed at Lambert-St. Louis Flying Field, St. Louis, Mo., by T. A. Batson, employment manager for the Universal Aviation School. Membership is restricted to Universal Flying School students, Universal corporation employees, and to those living at the school's student barracks near the airport, where all the social events will be held.

Officers were elected at the first meeting, which thirty-five members attended.

Recreation and sports are the chief purposes of the Universal Flying Club.

A RECORD for air travel in and out of San Antonio, Texas, was established during September when 711 passengers were handled through Winburn field in scheduled operations of American Airways and Bowen Air Lines. The increase from the 377 passenger figure of August is attributed to the addition of double daily service over the two lines.

NEGOTIATIONS are in progress between the city and landowners for the acquisition of a ninety-acre tract adjacent to Love Field, Dallas, Texas. Owners have not as yet been willing to accept the condemnation board price.

Other improvements at the field, including the traffic signal and lighting system, are awaiting the report of O. H. Koch, public works director, who conferred with government officials at Washington the last part of October.

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## NORTHWEST

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THE new repair shop of the Northwest Air Service, recently opened at Boeing Field, Seattle, is now a Department of Commerce approved repair station.

Authorized Service Station for Wright and for Kinner, this shop carries a complete stock of their parts, as well as a limited assortment of miscellaneous motor parts. The company serves also for Bendix, Scintilla, Eclipse and Stromberg accessories, and distributors for Berry Brothers' dopes and aircraft finishes in this territory.

ESTABLISHMENT of a radio fence along the 1,206-mile mail and passenger airway between Seattle and California cities by the aeronautics branch of the U. S. Department of Commerce has recently been announced. Boundaries of the new airway

will be marked by radio beams, broadcast by directive radio beacons stations, which will be erected at Seattle and five other Coast cities of major flying importance.

WEATHER is now made a matter of telegram-record by the teletyping system of the weather office at the Municipal Airport in Seattle. This facility permits of weather reporters elsewhere writing in direct through the telephonic hookup so that air conditions observed may be recorded and picked up in the Seattle office like so much stock ticker tape, by those taking stock in the weather.

EXTENSIVE programs of improvements have been launched at Clarkston, Wash. Committees of Lewiston and Clarkston chambers of commerce have taken charge of the airport development, and are leveling the runway, placing a fence along the north side, and will install a large number of markers.

ENLARGEMENT of the useable surface of the municipal airport at Seattle has been accomplished by drying and dredging of the field. For the first time since its construction King County's airport has this winter been thoroughly drained, giving a vast new acreage to this extensive airport. Other improvements now planned by Thomas D. Hunt, County Engineer, include the lengthening of the north and south runway from 1,900 to 2,500 feet, to accommodate large transport planes when wind conditions make use of the main runway impracticable.

THE Rasmussen-Meadows Co. on Swan Island airport, Portland, Oregon, has been named dealer for Oregon and Southern Washington for the Fairchild 22 high-wing two-place monoplane built by the Kreider-Reisner Aircraft Company, a division of the Fairchild Aviation Corporation, it was announced by J. B. Alexander, Los Angeles, factory representative.

RENEWING efforts to obtain appropriations for emergency landing fields in the Cascade Mountains and to further plans for a northern air route across the continent, Seattle aviation organizations are cooperating with the Seattle Chamber of Commerce in an effort to bring the need of the additional facilities before Congress. All hopes of gaining state help have been abandoned by the aviation organizations. The Seattle Aviation Country Club is acting as a coordinating unit to bring about concerted action by organizations along the entire route of the proposed airway, according to Herbert Munter, president of the club.

Plans to extend the north and south runway on Boeing Field at Seattle, Washington, by 2,000 feet are announced by Maj. Dave Logg, field manager. Extension is needed in view of a proposed flight from Seattle to Tokyo in the spring.

The flight, which is to be attempted about April, is to be made by two Japanese pilots, N. Nogoya and K. Asai, who were in Seattle last month to discuss their non-stop trans-Pacific hop with local aviation officials.

Extension of the runway at Boeing Field would give Seattle one of the longest runways on the coast. The completion of an additional 2,000 feet would make the runway more than 6,000 feet in length and provide ample take-off space for the largest planes with heavy loads.

SO POPULAR has become the new type of orientator designed and perfected by Lee Y. Eyerly, of Salem, that the building of these machines in the Eyerly Aircraft Corporation factory has become the most promising aviation manufacturing enterprise in Oregon.

Eleven "Acroplanes" as they are called have been constructed so far.

The "Acroplane" is a miniature airplane mounted on a strong metal framework, equipped with a propeller run by an elec-

tric motors and having surfaces which make it respond to the propeller blast in the same manner as a real airplane.

Arthur B. Mackenzie, president of the Acroplane Sales Corporation, a separate company formed to handle sales of the machine, will open offices in Los Angeles.

SIX thousand square feet of floor space is being added to the plant of the Boeing Airplane Company of Seattle, Wash., to provide additional space for the construction of 135 Army pursuits, seventy-five Navy fighters, seven bombing planes and various commercial and experimental projects. The new construction will cost about \$21,000.

THE FIRST AIRPORT marker for Twin Falls, Idaho, has been finished, a sign 125 feet long with letters four feet square having been placed on the roof of the largest warehouse in town. The words "Twin Falls" are accompanied by a large arrow pointing toward the south where the airport is located, five miles from town.

NUMEROUS IMPROVEMENTS are planned for the Wenatchee, Wash., airport in the near future. The Wenatchee Chamber of Commerce, through its airport committee, has obtained title to the airport and has made a survey of development requirements for the next two years. Improvements planned include leveling, oiling and paving the landing field.

IN ORDER TO carry out a program of current improvements at Sand Point, north of Seattle, Wash., the United States Navy will expend \$156,604 on contracts recently awarded. Expenditures on the navy station in 1931, aside from the \$50,000 available for the purchase of additional land, will total \$270,000, according to a recent report

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LIGHTS from Pocatello to Spencer, Idaho, are being installed after the authorization of the department of commerce. As soon as the lights have been installed along the entire route from Salt Lake City to Great Falls, Montana—which it is believed will happen in the early part of 1932—the flying schedule will be moved farther apart and better service be afforded.

THE POSEY MANUFACTURING COMPANY, Hoquiam, Washington, has received a Federal certificate of approval as an airplane repair station, the first on Grays Harbor. The certificate permits the plant to furnish parts for licensed aircraft.

## SOUTHWEST

THROUGH the services of the Don Lee Radio Station KGB in San Diego, California, and a mysterious Pilot X, radio audiences have had aviation lessons brought to them as a part of their dinner hour program. In an effort to popularize flying among the thousands of people who seldom visit an airport, Pilot X has simplified aviation by taking his listeners for a series of imaginary flight lessons. The various controls and instruments were carefully explained as well as their function in the operation of the plane. Interest was maintained by conducting the lessons as part of a cross-country tour with stops and descriptions of California's major airports.

At the close of the broadcasts, a set of questions were given out. The winner, Edgar Smith, a student at the Point Loma High School in San Diego, was awarded flight instruction in a Great Lakes plane by the T. C. Ryan Flying School.

THE plans of a light ship to be built by the Hancock Foundation School of Aeronautics, Santa Maria, Calif., have been completed by the engineering class and construction of this ship has been started by the airplane mechanics students. This ship has been designed throughout by the advanced engineering students and was selected from original designs made by these students. This practice will be continued with each engineering class and affords an unexcelled opportunity for a student to actually design a ship of his own, test a model of it in the school wind tunnel, and finally see the ship built and test flown by the flying division of the school. This is a part of the research being conducted by the H. F. C. A. to develop an economical light plane approved by the Department of Commerce.

DURING the month of November, in their program of assembly talks, smaller question and answer meetings, and conferences with vocational guidance counselors, in high schools and college, Messrs. Ken-

nedy, van Haitsma and Becker, of the Extension Department of Boeing School of Aeronautics, have in a total of 85 meetings, talked to a total audience of approximately 12,000.

THE old airport at Reno is for sale and the purchase of a new one is planned. Erection of runways and an administration office will bring the sum involved to \$75,000. An eighty-three acre field is planned.

The state board of examiners this year has approved a request for the purchase of an airplane by the aviation bureau, department of public works.

AVIATION enthusiasts in Davis county, Utah, have started an airplane course in the Davis school. The course is offered by the Utah Pacific Airways.

MARKING a seventy-eight per cent increase over the corresponding period of last year, a total of 8,353 passengers were carried by planes operating from the San Francisco Bay Airdrome, Alameda, during the month of November. Of this number 5,966 were carried by transport planes. Plane landings totalled 3,624, of which 1,902 were transports.

Oakland Municipal airport recorded 6,597 landings and 2,036 passengers, of which 367 were carried by transport planes, and 1,285 by taxi planes. Students enrolled at airport flying school totalled 376. Training planes made 4,447 of the total landings.

WITH the inauguration Thanksgiving Day of a passenger service linking the leading cities and resorts of Lower California, Mexico, Franklin Rose, president of Varney Air Service, Ltd., announced the separation of the transport and sales and service divisions.

The northern transport division, covering the San Francisco to Los Angeles and Sacramento service, is to operate under the name of Varney Speed Lines. Headquarters are located in the Varney hangar at San Francisco Bay Airdrome, Alameda, the bay region terminal.

The sales and service division, handling Waco, Stearman, Lockheed, Viking and Stinson planes, will continue to operate under the original name.

The third division covers the new service inaugurated in Mexico. This service, known as Varney Air Service of Mexico, operates six round trips daily between San Diego and Agua Caliente, three round trips daily between San Diego and Ensenada. Two round trips weekly between San Diego and San Quentin, on the lower tip of Lower California, are to be added in the near future.

AN AERIAL delivery service, linking airports of the San Francisco bay region, has been inaugurated by F. Myrten Johnston. Two Aeronca planes are used. James Buchanan is business manager of service.

A PRICE OF \$50,000 will be paid by the government to Dr. T. P. Bodkin for the deed to the 161 acres of land, which have been blocking the start of construction on the Army Air Corps base in Marin county. A consent decree was signed in the court of Federal Judge Alfred Sames in San Francisco.

CENTURY-PACIFIC LINES, LTD., has increased its San Francisco-Sacramento service to ten flights daily. The new schedule included a night trip out of the bay region at 7:30 p. m.

AN AIRPORT development campaign in northern California was to be launched December 12, when thirty-five planes take off from San Francisco Bay region airports for a tour of cities along the Pacific Coast. The tour, sponsored by the California State Chamber of Commerce, will extend as far south as Monterey. Captain William Royle will lead the flight.

AN AIRPORT was constructed at Palo Alto to accommodate planes bringing fans to the Stanford-University of California football game, November 20, the "big game" of the year for northern California grid followers. The airport, financed by the city, was established three miles east of the business center. A 2,800-foot runway extends from northeast to southwest. It is 500 feet wide. Special services were operated to the new field by bay region transport and taxi firms.

AVIATION to the rescue! It takes carefully arranged airplane attacks to conquer the murderous liver fluke, plague of sheep ranchers of the Southwest.

It was discovered by the United States Department of Agriculture that snails are perfect hosts to the larvae of the liver fluke which greatly endangers the lives of sheep. Various methods of exterminating the snails with the application of copper-sulphate were tested without success. An airplane pilot effectively scattered the death dust from the clouds.

INCREASES in most phases of air traffic were recorded at Oakland Municipal Airport, Calif., during September as compared with the same period of 1930, according to a report recently issued by the Board of Port Commissioners. The figures are as follows, for 1931 and 1930, respectively: Landings: other than student, 3,035, 1,451; student, 4,036, 5,795; transport planes: inbound, 250, 157; outbound, 249, 149; transient planes: inbound, 201, 157; outbound, 196, 151; passengers: transport inbound, 312, 208; transport outbound, 348, 246; transient inbound, 196, 177; transient outbound, 196, 154; sight-seeing, 1,835, 1,691; total passengers, 2,887, 2,476; students enrolled, 354, 312.

A SERIES of lectures on aviation was recently begun at the Hotel Whitcomb, San Bruno, Calif., under the direction of W. L. Frederickson, manager of the Happy Landings Aviation Club, Mills Field, San Bruno. These lectures are given free of charge by qualified instructors to those interested in aviation.

PUEBLO'S (Colorado) airport may revert back to direct control of the city if plans now being formulated are put into effect. The field has operated under four different ownerships. Tentative plans indicate that Western Air will continue operations of air mail and passenger planes from the port, paying the city a monthly rental fee for the use. Other aviators and flying concerns will also be assessed. Complete plans for the construction of a new hangar to be equipped with a complete machine shop for servicing airplanes at the port have also been made. The new \$80,000 airplane hangar at the Denver municipal airport has been finished.

REPORT that he had flown his Continental-powered Alexander "Flyabout" thirty hours at a total cost of \$15 for gas and oil was received recently by the Alexander Aircraft Company, Colorado Springs, Colo., from Art Whitaker, owner of one of the light two-place cabin monoplanes. He averaged 140 miles for each dollar spent on fuel. His Flyabout is powered with a thirty-eight horsepower engine, and carries two persons and baggage.

MRS. STEPHEN ABBOT of Salt Lake City, Utah, has been appointed one of the two governors of the District of Utah for the Women's National Aeronautical Association of America, according to an announcement of Mrs. Edith Shaeffer Stearns of Miami, Fla.

PASSENGER business of the National Parks Airways is steadily increasing, the company recently reported. A total of 360 passengers was transported on its lines in one month. This airline will do considerable night flying during the coming winter, and lighting installations have been extended to Monida from Pocatello. In order that the new daily double schedule may be maintained from Butte, Mont., to Salt Lake City, Utah, the airline has purchased a new Boeing mail and passenger plane, equipped with a two-way radio.

A SPORTSMEN'S landing field has been established at Requa, at the mouth of the Klamath River, near Eureka, Calif. The landing field, donated to the county by R. A. Fontaine, has a single runway 1,500 by 200 feet.

AN AIRPORT has been constructed on the Ukiah, Calif., estate of W. P. Fuller. He uses his plane to fly between the estate and his offices in San Francisco.

WOMEN AVIATION enthusiasts of cities on the east side of San Francisco Bay have organized the Women's East Bay Aviation Club. Luncheon meetings are held the first and third Thursday of each month. Helen Carter, vice president, presides at the meetings. A flying club is planned.

ANNOUNCEMENT was made recently that the City of Denver, Colo., will start work soon on construction of a dope building at the municipal airport. The structure, costing \$6,000, will be thirty feet by sixty feet by twenty feet.

TWO new planes have been allotted to the 329th Observation Squadron stationed at the Salt Lake Airport, Salt Lake City, Utah, giving the local unit a total of five planes, according to Lieutenant Clarence P. Talbot, unit instructor. The planes are new Douglas O-2H biplanes, and will be delivered from Rockwell Field, San Diego. Another plane will be added to the unit in February.

CAPT. Rufus J. Pilcher has been appointed manager of Clover Field, Santa Monica's Municipal Airport, succeeding Lieut. Duff Wilson. Captain Pilcher is well and favorably known by everyone connected with the aviation industry on the West Coast. In 1928 he was the chief of operations for the National Air Races, has managed a number of smaller air races on the coast, and was formerly assistant manager of the aviation department of the Richfield Oil Company.

ANNOUNCEMENT has been made by Col. Thomas A. Davis, head of the San Diego Army and Navy Academy, of an affiliation with the T. C. Ryan Flying School, Government approved school of transport rating, whereby the latter organization will give aeronautical training to academy students.

The Academy will provide aeronautical training for its students as a part of their regular academic and military courses. The course calls for lectures at the Academy twice weekly and a weekly period in the shop at the Ryan Airport.

IN ORDER to protect the surface of the municipal airport, Denver, Colorado, imposes a tax of \$25 per month on all airplanes using tail skids instead of wheels, according to an announcement made Nov. 5 by Walter B. Lowry, manager of parks and improvements. This ruling affects only those planes making the municipal field a regular base. This provision will be incorporated in future contracts between the city and airlines using the port as a permanent base. In the past, tail skids have caused a great deal of damage to the field, which fact prompted the ruling.

SAMUEL METZGER, pioneer San Francisco bay region flier, has taken the agency for the Kellett sport autogiro. He has established sales offices at San Francisco Bay Airdrome, Alameda. Noble Heuter, formerly the Transcontinental and Western Air, Inc., is sales manager.

EDWARD M. VERNON has been appointed to the weather bureau staff at Oakland Municipal airport, replacing Richard Garrett, who resigned to enroll at University of Colorado. Vernon was formerly a member of the Oakland airport bureau, resigning a year and a half ago to join the Transcontinental & Western Air, Inc., weather staff.

G. WILBUR CORNELIUS recently flew his free-wing plane for three and one-half hours without touching the controls. The flight was made over the San Francisco bay region with R. P. Bowman of the Oakland N. A. A. chapter as observer. Cornelius plans an endurance flight, to be backed by Endurance Flight, Ltd., a California corporation.

H. A. (Pop) Ludwig, with headquarters at United Airport, Burbank, California, has just been appointed factory representative for Bird Aircraft in that territory. He is now on a tour of California in one of the 4-place 125 h.p. Kinner-Bird demonstrators.

THE AERONAUTICAL Committee of the California State Chamber of Commerce has compiled an aviation primer which is soon to be introduced into the primary schools of the state. The primer outlines the history of transportation in California from primitive times to the present day. The Standard Uniform Course of Aviation Instruction which the chamber introduced into secondary schools and junior colleges in 1930 is to be rewritten to include recent developments in aeronautics.

ANOTHER of the regular T. C. Ryan Flying School cross-country flights was made recently from Ryan Airport in San Diego, California, to San Francisco Bay Airdrome. The trip, which lasted two days and covered approximately 1,200 miles, was made by Roy A. Waugaman of Nome, Alaska; Richard Meysenburg of La Jolla, John C. Yates, Cecil R. Phillips and Adelaide Smith of San Diego—all transport students or graduates of the Ryan School.

Long cross country flights are featured for transport students at the Ryan Flying School in San Diego. According to T. Claude Ryan it is his purpose to give his students the advantage of training over the various types of terrain which are available in Southern California, as well as familiarize them with the major airport operations on the West Coast.

# LATIN AMERICAN AVIATION

## *Need for Air Treaty Seen in Regulations of South American Governments*

ATTEMPTS of South American governments to retaliate against airline operation regulations of the United States are resulting in confusion over American-operated lines in the south and must eventually bring about air treaties, experts believe.

The United States Government has a regulation that all foreign airlines entering this country must use American equipment and be flown by American pilots.

Various countries of Latin America are contemplating similar rules, a situation that operating companies regard with consternation. Pan American Airways, for example, crosses the territory of more than a score of countries. If it were required, officials point out, to employ a separate personnel for each country, the result would not only make operating costs impossibly high but would result in such confusion that the only solution would be the abandonment of the services.

Mexico has already passed a regulation requiring the employment of Mexican pilots, a fact which caused considerable difficulty inasmuch as operating companies found that native pilots usually were not qualified for flying over the mountainous regions. Brazil recently passed a law requiring that all radio operators of planes landing in that country be able to read and speak Portuguese, a regulation tantamount to requiring the employment of natives.

## *Mexico Requires Permit for Flying*

MEXICO has issued a decree that no American aviators shall fly over Mexico without permission, and have instructed commanders at border points to "forcibly ground planes which disobey the order."

## *Vera Cruz to Have New Air Service*

IT IS reported that a concession has been granted by the Mexican government for the establishment of air services in Vera Cruz, radiating from Jalapa, the state capital. One service is to be established from Jalapa to Orizaba via Ruatusco and Cordoba; the second from Jalapa to Tuxpan by way of Misantla, Papantla, Martinez de la Torre, Jicaltepec and Cutierrez Zamora. Four-passenger planes are to be used.

## *Scadta Airways Lowers Rates*

THE SCADTA AIRWAYS SYSTEM has effected a considerable reduction in passenger rates on its airlines in Colombia, bringing the cost for a trip from the United States via the north coast of

Colombia to interior points in line with the cost of an all-water-land trip.

In combination with Pan American Airways, the Scadta system offers a fast service from the United States, the entire trip from New York to Bogotá requiring only three and one-half days.

## *Air Mail Queens to Get Free Rides*

Free trips by air across Mexico will be given during the first week in January to the women chosen to be "Queen of the Air Mail Service." The Air Transport Corporation operating the air mail and passenger service between Brownsville and Mazatlan has initiated a popular voting contest, issuing one ballot with every air mail stamp bought. One woman from each stop along the route who receives the most ballots will be given a free trip to Mazatlan and return.

## *Argentina Produces First Civil Airplane*

THE GOVERNMENT factory in Argentina has turned out its first civil airplane and has placed it on sale at approximately \$2,350. The organization is known as the Argentine National Aircraft Factory and is located in the Province of Cordoba.

## *Aeropostale Renews Inter-Continental Air Mail Service*

AIR MAIL service from Peru to Europe and Africa has been resumed by the French company Aeropostale. The service is weekly. The route is by way of Chile, Argentina, Uruguay and Brazil to Natal. From Natal to Dakar, Africa, the mail is transported by steamer and from Dakar by air to all points in Europe and Africa served by airlines. A charge of approximately forty cents for letters and twenty cents for postcards is added to the regular postage charge.

## *Argentine Government Assumes Operation of Abandoned Air Services*

AIR SERVICES in Argentina from Bahia Blanca to Rio Gallegos are again in operation after having been abandoned by the Aeroposta Argentina, this time on a rental basis by the civil aviation department of the Argentine Government. Pilots and mechanics of the Aeroposta company are employed but are under the direct supervision of the civil air ministry. Stops are made at Viedma, Rawson, Comodoro Rivadavia and Rio Gallegos.

Service to Paraguay, which was also abandoned by the French company, is to be placed in operation again under a similar arrangement on Jan. 1. Buenos Aires will then be connected with Asuncion, Paraguay, via the provinces of Entre

Rios and Corrientes. Two round trips will be made each week.

## *Chile Establishes Customs Regulations*

AIRPLANE CUSTOMS regulations have been established in Chile whereby pilots carrying goods for importation and exportation must carry detailed bills of lading for verification and clearance at the airport nearest to destination where there is a customs official. These bills of lading must also be checked at the first airport on entering or leaving the country.

## *Air School for Chihuahua Is Planned*

COLONEL ROBERT FIERRO, Governor of Chihuahua and former chief of civil aviation, plans to establish a civil aviation school in Chihuahua City. His application for a permit has been placed with the communications department. Fierro has been one of Mexico's most prominent airmen since his non-stop flight from New York to Mexico City in June, 1930.

## *Mexico Establishes Co-Pilot Regulation*

A NEW element of safety in air travel has been added to the various air passenger lines of the Republic. The new rule which has been adopted by air officials of Mexico provides that all planes with a capacity of more than ten passengers must carry a co-pilot.

## *Guatemala Operations Curtailed*

NATIONAL AVIATION CO. of Guatemala has reduced operations because of the decrease in passenger and freight traffic and reduced government aid. Beginning November 1, 1931, a direct daily, except Monday, service is maintained between Guatemala City and Quetzaltenango. Another daily round trip service is operated to Coban. Stops at Salama, Rabinal and Tactic will be made by special arrangement when there are passengers for any of these towns. Each Monday a plane makes a direct flight to Flores (Peten), but stops at Coban on the return flight. All other services have been abandoned with permission of the government, but the company retains the right to make special trips to all places in the republic which have landing fields. All of the guarantees to passengers called for in the company's contract with the government remain in force.

## *Peruvian Services to Carry Samples*

PRINTED matter and samples from Peru to foreign destinations will be carried by the French company, Aeropostale, according to a Peruvian resolution dated November 6, 1931. A charge of 1.6 soles, in addition to ordinary postage, for every 50 grams (1.76 ounces) will be made. Material to be carried may be deposited at the Lima post office up to 8 p.m. of the night preceding the day of departure.

# FOREIGN NEWS IN BRIEF

Compiled from reports from AERO DIGEST'S correspondents and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

REPORTS from consular offices in widely separated sections of the world show definite improvement in air transportation facilities.

A large American motor company has acquired the Union Airways of South Africa operating between Cape Town, Port Elizabeth, Durban and Johannesburg on weekly schedule.

The services on the Shanghai-Hankow-ichang airline, after passing through many difficulties and loss of equipment as a result of the disastrous Yangtze River flood, is again operating on regular schedules. Officials of the aviation company said the service would be extended to Chungking before the end of the year.

A company has been formed to operate a bi-daily air service between Gibraltar and Tangier, a distance of 30 miles. This service will reduce the travel time between the points from three hours and more to about twenty minutes.

Air mail service has been established between Seville, Spain, and the Canary Islands on a schedule of two round trips each week.

Latest figures show that there are more than 17,000<sup>8</sup> civil aircraft in the world, of which approximately 2,000 are engaged in regular air transport.

TWENTY-FIVE companies in fifteen countries are now included in the International Air Traffic Association, an organization designed to effect standardization of operations. Insurance and liability matters are among the important questions being considered at the present time.

## GREAT BRITAIN

WHEN Bert Hinkler landed at Hanworth Airdrome, London, on December 7, he had completed a solo flight from the United States to England by way of Brazil and Africa, making in the course of the flight

the first west-to-east crossing of the South Atlantic.

Hinkler made his flight in his Puss Moth plane, powered with a 120-horsepower Gypsy engine, in long stages. His first hop was from New York to Jamaica, a distance of 1,800 miles. From Jamaica he flew across the Caribbean Sea down the coast of South America to Natal, from where he took off on the first lone transatlantic flight since Lindbergh's and the first crossing ever made in a light plane. He landed at Bathurst in the Gambia, proceeding from there by way of St. Louis to Cape Juby, Spanish West Africa, to Casablanca, Morocco; and to Madrid. From there he flew to Tours, France, and then made his final hop to London on his 10,500-mile flight.

Hinkler's plane was equipped with extra fuel tanks, bringing the capacity to 131 gallons, which was enough for a non-stop journey of 2,300 miles. The ocean flight was 1,950 miles in length.

The Australian flier first became prominent when he made a flight from London to Port Darwin, Australia, in fifteen and one-half days.

EUSTACE and Oswald Short, partners in one of Britain's oldest and best known aeronautical firms, are designing a balloon, to be the largest ever built, for a trip into the stratosphere. They plan to ascend to a height of fifteen miles, which they estimate can be reached in one hour. The descent they anticipate will require five or six hours. It is believed that currents in the stratosphere may carry the balloon, taking off from Cardington, England, as far east as the steppes of Russia. The balloon is to have an outer shell of metal.

THE BRITISH AIR MINISTRY has purchased American aerial broadcasting apparatus to be used in subduing rebellious tribesmen of Iraq. It is believed that a

voice from the sky speaking in the native tongue will be a most effective medium in dealing with the natives. Equipment was purchased from the Plane Speaker Corporation of New York.

THE KING'S CUP RACE for 1932 will be open to all British subjects and to all kinds of airplanes, the only stipulation being a speed of at least 110 miles an hour. The Royal Aero Club has given up the attempt to make the annual race around Britain an event for amateurs only.

DESPITE the earnest efforts expended by some of her advocates of lighter-than-air craft, Great Britain has abandoned her airship project through which she hoped to link her colonies in an air communication system. This fact was definitely established with the sale of the R-100 for scrap metal. The dismantling of the airship will give three months' work to the airship men at Cardington Air Station.

The plans being developed for huge flying boats, more than twice the size of the DO.X, suggests to many that Great Britain may be substituting the airplane for the airship and will continue her effort for an air empire.

## RUMANIA

RUMANIA intends the purchase of military aircraft equipment of both bombing and observation types. At present no funds are available, but it is usual to make "extraordinary" allotments when it is necessary to purchase planes.

The establishment of a factory in Rumania by Messerschmidt is contemplated, which factory would probably submit bids for the equipment needed by the government.

CIVIL AVIATION in Rumania is supported by subsidy, the budget for 1931 amounting to approximately \$214,884.



The 120 h.p. moth in which Bert Hinkler made the first west-to-east crossing of the South Atlantic enroute from New York to London

P. & A. Photo

**Here's  
Real News!**

**HEATH Aircraft  
Now Eligible for  
Federal Licenses**

The new Heath model LN has been granted Approved Type Certificate 456 by the U. S. Dept. of Commerce. This makes the Heath LN the lowest priced Approved Type plane in America—the plane that brought back the light plane world's altitude record from France.

But even more important, Heath has arranged with the Dept. of Commerce for LN models, assembled at home, to be eligible for "NC" Licenses. This makes it possible to gain not only the economy and performance Heath has always provided, but to do so with the full approval of the Dept. of Commerce.

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*Write today, for information on this remarkable step, so typical of Heath Leadership! Learn how you can assemble the splendid new Heath LN at home and have it eligible for Federal license. Learn how little it costs to fly the Heath way—and what an outstanding airplane this altitude record model is for you.*



**NEW TOO! EASY TERMS**

*Heath Aircraft may be assembled at home, or purchased ready to fly, one-third down, balance on notes. Heath has pioneered light aircraft for 22 years. Heath has won in its class at National Air Races for years. Heath is the answer to popular inexpensive flying. Write today for full information.*



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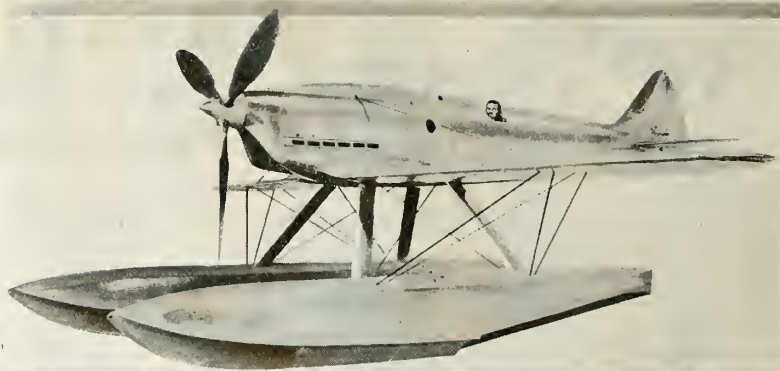
Three air transport companies are in operation: "Lares," the government line, operating between Bucharest and Chistnau and between Bucharest and Balceic; "Cidna," the International Air Navigation Company, operating between Bucharest and Paris, and Bucharest and Istanbul; and the Polish government line "Lot," which maintains a service between Bucharest and Warsaw.

## RUSSIA

A "WINGLESS" autogiro has been produced by Soviet aviation engineers. The conventional airplane wing, which had been reduced in area in the Cierva Autogiro, is eliminated and the rotors are located underneath the fuselage. A four-bladed rotor system is used. The new creation maintains the characteristics of the autogiro in landing and taking off in a small area and has a take-off comparable to that of the conventional airplane.

It is reported that the Russian craft will be used for research flights in the Arctic, for aerial photography and attacks on agricultural pests from the air.

RUSSIA is laying the foundation for air transportation into the more remote parts of the country in the construction of the ANT-14, an all-metal, thirty-two passenger monoplane. One of the ships has already been constructed and the problem at present before the Soviet engineers is the possibility of mass production of the type. The ANT-14 is powered with five engines of 480



The DH41 built by the Dewoltine Company of France for the Schneider races

horsepower each, has a wing spread of 134 feet, a flying weight of eighteen tons, and a maximum speed of 133 miles per hour.

## FRANCE

A CONSIGNMENT of seaplanes has been shipped to Saigon, where the French Navy is establishing a new base in the Pacific, from which to guard French shipping into the China Sea and from the Mediterranean to China and Japan. The station will have an arsenal, submarine docks, fuel depot and barracks for the naval staffs and airmen. Previously there have been few French seaplanes stationed in the Pacific. The base is to be completed this winter.

PLANS for increasing interest in gliding in France have been worked out by the Undersecretary of State for Air, who intends to ask for a special fund of 1,000,000 francs (\$39,200) to be devoted to the development of the art. One feature of the program is the prospective organization of a national gliding center comprising an institute of aerology and practical aerodynamics, a field for gliding and a gliding school.

## GERMANY

A NEW model rocket airplane with wings that fold in flight has been tested by Reinhold Tiling. The model, measuring about five feet in length and propelled by thirteen pounds of explosives, traveled about five miles. The wings fold in ascending and unfold as the highest point of the flight is reached, so that the plane descends as a glider.

A NEW Zeppelin airship, the LZ-129, which will surpass the size of the *Akron* of the United States, is to be built in Germany. It will displace over 7,000,000 cubic feet, will be 800 feet long, and will be equipped with heavy oil engines.

## AUSTRALIA

WESTERN AUSTRALIA AIRWAYS has put into effect rates comparable to those of other forms of transport, with the result that traffic has been considerably augmented.

AUSTRALIAN NATIONAL AIRWAYS, formed by Air Commodore Kingsford-Smith and Flight Lieut. Ulm, made an experimental flight to England, carrying mails and passengers. The flight was started on November 20, with G. U. Allen as pilot. The trip was the first over the route carrying passengers and is unique in that the company will not receive a subsidy from the government. Radio was carried.

Australian National Airways for some time carried mail and passengers interstate from Sydney but the services were discontinued because of financial difficulties.

## PROGRESS OF AVIATION IN CANADA

The third quarterly report of the Civil Aviation Branch, Department of National Defence, Ottawa, shows that despite the issuance of a considerable number of pilot licenses, the number in force at the end of September, 1931, is slightly below that in force at the beginning of the year. There were 271 private pilots, and 393 commercial pilots in the Dominion at the end of September as compared to 311 and 402 respectively on December 31st, 1930. There are 489 aircraft licensed in Canada, 406 air engineers and 75 air harbors.

The carriage of air mail, despite the drastic pruning of routes during the year, has kept well up to last year's mark, and is ahead of the 1929 total. To the end of the third quarter 400,075 pounds of mail were carried on twenty-one contract routes and on special flights. Seven routes have been cancelled since the beginning of the year, three of which have been shortened into two new routes, these being the Winnipeg-Edmonton air mail service via Regina, Medicine Hat, Lethbridge and Calgary, and the Toronto-Detroit route which formerly extended to Montreal. Two new international mail routes were inaugurated during the third quarter, the Halifax-Boston service, and the Vancouver-Victoria-Seattle service. Passen-

ger traffic on the mail routes for the first nine months of the year totaled 3,389, with thirty planes on these lines.

The light airplane clubs, sponsored by the government, continue their progress, the Edmonton and Montreal clubs both having more than one thousand hours of flying to their credit for the nine months of this year. There are now twenty-three clubs actively engaged with 2,871 members and sixty-seven planes. Since the inauguration of these clubs in 1928 they have flown 48,476 hours, and have obtained 495 private pilot licenses and 158 commercial pilot licenses.

THE LAST of five radio directional aircraft beacons has now been installed in western Canada at Red Deer, Alberta, giving a complete service along the air mail route from Winnipeg via Lethbridge and Calgary to Edmonton.

The new station guides planes flying between Calgary and Edmonton, while the remainder of the route is covered by stations at Lethbridge, Alta.; Maple Creek and Regina in Saskatchewan; and Forrest, Manitoba. The new station operates the aural and visual methods of directional transmission, and is also used for weather report transmission.



# AVIATION MECHANICS COURSE



The new Curtiss-Wright Mechanics' Course provides the best preparation you can possibly find for a ground position in Aviation. The sound, practical training you obtain in this course applies towards a United States Department of Commerce Airplane and Engine Mechanic's License. Train to be an aviation mechanic. No other industry offers a brighter future, more interesting work, or better pay.

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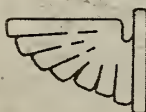
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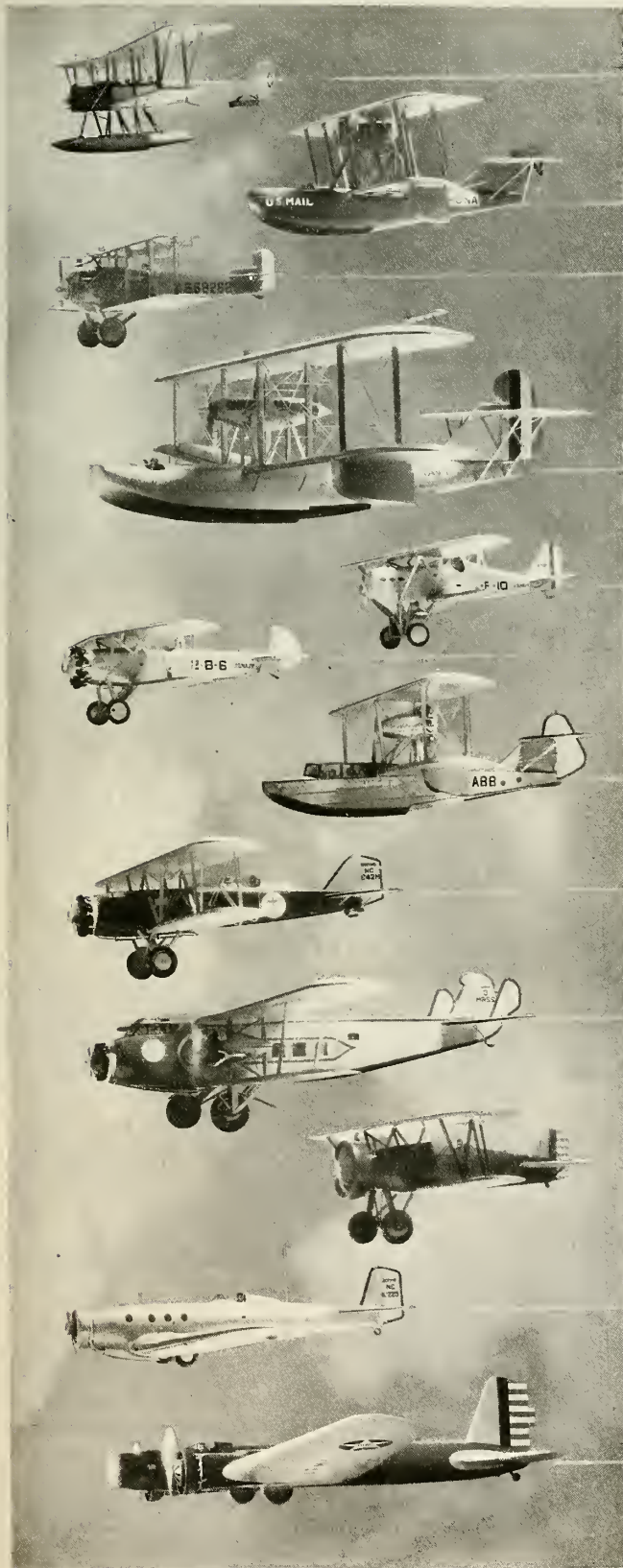
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- ◀ 1916 *(B&W) — The first airplane produced by the Boeing Airplane Company, a two-place biplane trainer built as a seaplane.*
  
- ◀ 1919 *(B-1) — One of the first Boeing commercial airplanes, a flying boat operated in airmail service for many years over Puget Sound.*
  
- ◀ 1921-22 *(MB-3A) — Army pursuit plane, two hundred of which were built by the Boeing Airplane Company.*
  
- ◀ 1925-26 *(PB-1) — Navy patrol boat weighing thirteen tons, the largest Boeing plane ever built.*
  
- ◀ 1926-27 *(FB-5) — Carrier-type fighter, built by the Boeing Airplane Company for the Navy.*
  
- ◀ 1927-28 *(F3B-1) — Boeing Navy carrier-fighter with air-cooled Wasp engine.*
  
- ◀ 1928-29 *(204) — Flying boat, an advanced development from the early model of 1919.*
  
- ◀ 1929 *(40-B4) — Four-passenger Hornet-powered mail plane of the series started in 1927 when the Boeing Airplane Company entered the field of mail-passenger plane construction.*
  
- ◀ 1929-30 *(80-A) — Transport plane powered with three Hornets, designed for mail-passenger operation over United Air Lines, the world's largest air transport system.*
  
- ◀ 1930-31 *(Army Type P-12C) (Navy Type F4B-2) — Wasp-powered pursuit plane, one of the fastest fighting planes produced today.*
  
- ◀ 1931-32 *(Monomail) — A development in mail-passenger transport planes, an all-metal Hornet-powered monoplane with retractable landing gear.*
  
- ◀ 1931-32 *(Bomber) — High-speed bombing plane of all-metal construction carrying more than a ton of bombs and armament. Twin-Hornet monoplane with retractable landing gear.*

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*Next regular enrollment, April 4, 1932*

## BOEING

SCHOOL OF AERONAUTICS  
Subsidiary of United Aircraft & Transport Corp.

### THE WING SECTION DRAG

(Continued from page 37)

The surface friction drag coefficient of plane surfaces has been found by measurements in the Goettingen laboratory to be given by the formula  $C_F = \frac{0.074}{\sqrt{R}}$  referred to

the surface, which is about twice the area. In this formula  $R$  denotes the Reynolds number  $R = V l / \mu$  the product of the velocity and the chord divided by the ratio of the viscosity to the density of the fluid. In standard air, the Reynolds number for 100 m.p.h. is about 1,000,000 per foot length. Hence for a chord of 5 feet, and 100 miles per hour, the Reynolds number is about 5,000,000. The drag coefficient from the above formula results then

$$C_F = \frac{20.074}{\sqrt[5]{5,000,000}} = \frac{0.148}{21.9} = 0.0067$$

It is therefore seen that the minimum profile drag of a conventional wing section is practically equal to the surface friction drag. This is a confirmation of the theory. It points the way for further progress: more lift and less surface friction. Improving along the trodden path may bring a small percentage of gain but nothing sweeping can be expected from that source.

In the next article we shall discuss the drag of the parts of the airplane other than the wings. This drag is usually termed "parasite drag" in order to express the abhorrence the designer feels with respect to them. The profile drag of the wings is in no way better off than or different from the parasite drag and should therefore be classified with the parasite drag of the other parts. This would not only be logical but also more practical as the drags being almost independent of the angle of attack would then be separated by a common name from the induced drag which depends very pronouncedly on the angle of attack.

*This is the nineteenth of a series of articles by Dr. Max M. Munk. Copyright 1932. All rights reserved by the author.*

## BLIND FLYING

Flight Lieutenant H. F. Jenkins

Chief Instructor, Air Service Training Ltd.,  
Hamble, England

**T**O grasp fully what is meant by "blind flying," it is first necessary to understand a little of the complex action of the human system which enables a man to fly in the ordinary way.

The controls of an airplane are worked by the muscles of the hands and feet, and every movement of the plane is controlled by these muscles. They must, however, receive their orders through the agency of the nerve paths from the brain of the pilot, and the brain must in turn use its perceptive members for its information.

The major part of the information relied upon by the brain is that obtained by the eyes, although some—such as the whistling of the wires in a dive—is obtained through

(Continued on following page)

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Room A-1, Airport, Oakland, California

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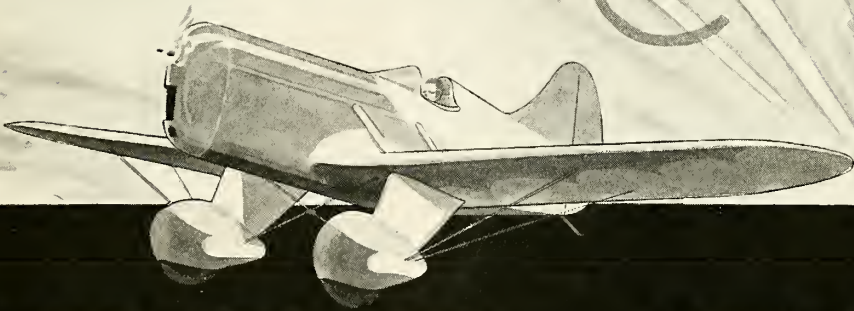
<input type="checkbox"/> Private Pilot	<input type="checkbox"/> Boeing Master Pilot
<input type="checkbox"/> Limited Commercial Pilot	<input type="checkbox"/> Boeing Master Mechanic
<input type="checkbox"/> Transport Pilot	<input type="checkbox"/> Special Master Pilot (For Transport Pilots)

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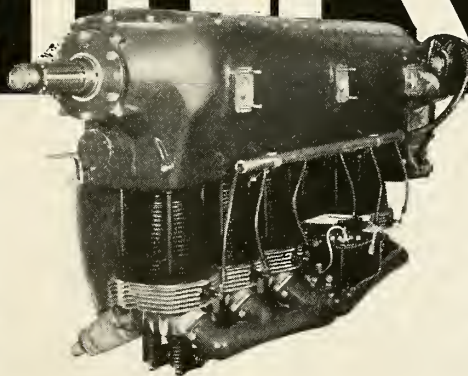
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(Continued from preceding page)

the ears, and again some is obtained by the feel on the seat, etc.

It is, however, definitely established that without the eyes it is impossible to fly for any length of time. The eyes rely on horizons or datum points so that they may convey to the brain the amount of movement, if any, from a datum plane or point in either of the three dimensions of flying.

A bad horizon, as in misty weather, will cause a greater strain on the pilot because it is more difficult for the eyes to locate the information required.

When the eyes are unable to pick up a datum point or horizon, a condition is reached which is termed blind flying. When flying through clouds it is often possible to pick up a patch slightly darker than the rest, and immediately the eyes function again, but when there is a complete absence of any information, such as may obtain in thick fogs, clouds and especially clouds at night, then the pilot can quickly lose all control until the eyes can function normally. The difficulty is that when the clouds are very close to the ground it is too late to regain control of the machine.

In these days of advanced aviation, when structural and engine failures are very rare occurrences, the safety of flying almost entirely depends upon the skill, judgment and airmanship of pilots, and the record of accidents directly or indirectly attributable to pilots being unexpectedly caught in circumstances of bad visibility is regrettably a long one.

### *Bad Visibility and Accidents*

Many inexperienced pilots have been sorely tried by the lack of a clear horizon, particularly when maneuvering

near the ground, and so get into difficulties when there is sufficient height for recovery. Taking off in conditions of bad visibility has also claimed its quota of accidents. Encountering fog when making a cross-country flight or being compelled to climb into cloud to avoid high ground has also resulted in crashes. In fact, so high is the proportion of accidents in which the basic cause is inability on the part of the pilot to orientate himself that this failure can be regarded as one of the principal flying risks.

### *How Blind Flying Has Developed*

With a view to reducing these risks, experiments in fly-

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ing by instruments were carried out in England as far back as 1917 and 1918. At that time, however, suitable instruments were not available, but even so, constructive results were achieved and pilots were taught to fly with reasonable accuracy for short periods in clouds. Shortly after the Great War, the development of blind flying was continued in France, and later, considerable experiments have been made possible in America by Daniel Guggenheim, who inaugurated a fund for this purpose. It is only recently, however, that the necessity for pilots to be trained to fly by instruments has received recognition in England and a system of training is now established at the Central Flying School, the premier training unit in the Royal Air Force.

As a result of the developments at the Central Flying School, the definite conclusion has been reached that practically the whole of the risks arising from conditions of bad visibility can be overcome by the training of pilots in the technique of blind flying. The reliability of instru-

ments specially designed for the purpose has played an important part in making this training practicable.

**Instrument Flying Is More Accurate**

In addition to the primary object of a training in blind flying, that is, to enhance security in bad visibility, instrument flying has also provided for more accurate flying in more ordinary circumstances than is afforded by its counterpart, "sensory flying" and allows of greater precision for specific purposes such as dead straight runs of short duration for wind finding, vertical photography, or experimental purposes.

The average pilot who has not approached the subject with an open and analytical mind will nearly always claim to be able to fly blind if need be, yet if called upon to do so, is usually able only to provide some good excuse for his failure. It is probably quite true that the average pilot can fly reasonably safely through a cloud-bank for a very short period of, say, ten minutes, but tests at the Central Flying School of about eighty keen pilots with flying ex-

sound lines is essential. No pilot can fly merely by his senses without reference to some external datum.

Secondly, instruments do not give a really natural reaction and their use to replace the normal external datum is always, therefore, a matter of effect rather than of instinct.

Thirdly, the senses are not only inadequate for flying blind but are definitely misleading.

Without elaborating on these conclusions, it is necessary to emphasize the last. Nearly all pilots who have tried to fly in a cloud, particularly if they have endeavored to maneuver under these conditions, can admit to peculiar and erratic results. They obey their senses, notably that of deep muscle or "seat" feel, and the airplane unfortunately does not behave as it should. The result is that most pilots come out of a cloud in a steep nose-down spiral and frequently in a spin. The reason for this is always the same and actually amounts to the fact that the pilot is unable to distinguish sensorily between a yaw one way and a wing-down the other.

**Assessing Errors in Control**

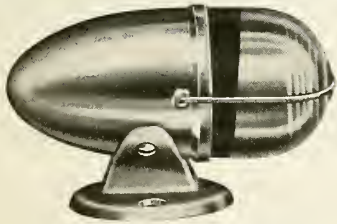
These shortcomings can, however, be met by proper training in the use of carefully selected instruments. Curiously enough it is found that nearly every error committed in blind flying is due to the misuse of the rudder, in fact, the difficulty of control has been assessed in the proportion: rudder, elevator and aileron, 6. 2: 1, for nearly all pilots on at least four widely different types of aircraft, including twin-engined, heavy airplanes.

In consideration of the fact that practically all errors are

*(Continued on following page)*

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perience ranging from 300 to 2,000 hours showed that *not one* of them could fly blind safely for more than twelve minutes, even when provided with adequate instruments, without specific training in the use of these instruments. The reason for this is only apparent when the question of training for blind flying is examined. Certain conclusions are then arrived at unmistakably which throw a light on this very important subject.

Firstly, the process of flying blind is at first unpleasant to such a degree that firm instruction on psychologically

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## ***Continental Engines***

(Continued from preceding page)

due to yawing, probably owing to faulty use of the rudder, or unappreciated effects of aileron drag, it is evident that the turn indicator must be the basis of instrument flying.

### Training in Stages

In training, the method which has been adopted as a result of natural evolution enables a pilot to build up his efficiency in stages, starting with the use of the rudder alone, then the elevator alone, then ailerons alone, and then gradually combining any two, and finally all three, until after, say, eight hours, coordination is achieved.

Skill in blind flying can only be achieved by painful experience and the development of concentrative powers not usually called upon in flying. Nobody likes blind flying for its own sake but no pilot's technique is complete without a reasonable degree of skill in this direction. The pilot who can fly blind in the full sense should be able, entirely blinded, to take off, climb, fly really straight and level, turn to change course as often as desired, spin and recover, recover from any attitude without unnecessary loss of height, glide and change course on the glide, and be able to correct for nose and tail heaviness or lack of lateral trim. Such is the standard which should be aimed at when training pilots to fly blind and results have already proved that the average pilot is capable of achieving this with proper training.

In conclusion, it would perhaps be well to emphasize that an enhanced morale is a direct result of ability on the part of a pilot to compete with unexpected or known fog or cloud, and morale plays a very strong part in the ordinary duties of a pilot.

### BIPLANE EFFECT IN NOSE DIVE

(Continued from page 35)

further increases in moments and loads on parts critical in strength for the particular condition under consideration.

Nose dive investigation apparently must also be made for the angles of attack somewhat below and above the zero lift angle, since in the former case the relative magnitude of the lower wing moment coefficient increases rapidly as compared to that of the isolated airfoil, while for slightly higher angles of attack the absolute value of the moment increases considerably.

### Conclusions

In nose dive structural calculations of a biplane it is imperative to take into account the change in magnitude of the lower wing moment coefficient, which (for the type of wing cells ordinarily used) may be *twice as large* as the uncorrected monoplane value.

The relative torsional deflection of the upper and lower wings of a biplane must be such as not to induce unfavorable decalage under loads and moments acting in a dive.

A thorough study must be made of biplane effect for various cell combinations including the effect of decalage on load distribution and particularly in regard to changes in moments.

In nose dive analyses the range of investigation should also include angles of attack above as well as below the zero lift angle.





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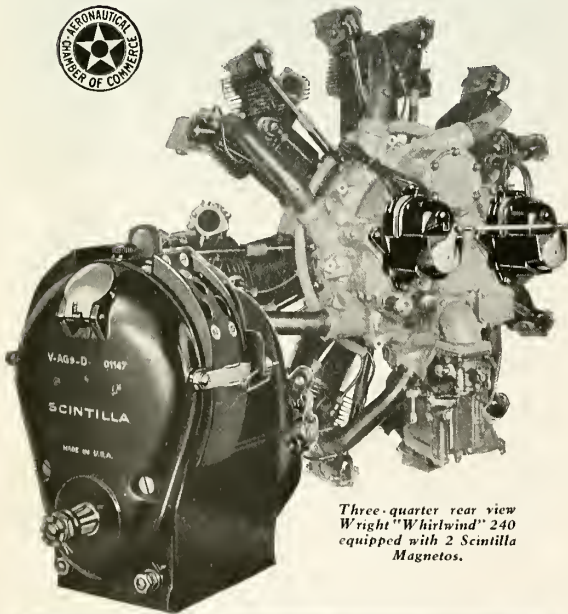
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## MERRY-GO-ROUND

(Continued from page 29)

impossibility of the last one, too. Also we are in a depression, as the world was in 1914. The number of men who would gladly join the army for three meals a day increases week by week.

To the faithful in aviation who have their pilot's certificate and very little else, I would say hold tight and gird thy loins for the fray. War is in the air. It may blow over for a year—or even five years, for that matter. I make no prophesy, mark that! But according to Uncle Cuthbert's formula the circle is nearly complete, and we are nearing the point where we get on the military merry-go-round again. I hope I grab a brass ring this time. The proneness of the human race to progress in circles has been mentioned before. War—Peace, peace—war. Around the circle, a complete revolution every generation.

I have no inside information, but like an old cavalry charger I sniff war in the air. I smell frozen assets; a war will melt them. I smell the acrid tang induced by the friction between Bolshevism and Capitalism; and Russia is next door to Manchuria. Soon lads who own no capital may be flying forth to protect Capitalism. And the Bolsheviks (merely the Russian word for Majority) may be rushing out to fight for the select Minority who control them.

A farce? "Of course it is," said Uncle Cuthbert. But simple folk like you six readers and myself are not supposed to discern that. And we don't, that's the amusing part of it. Each war finds a new and enthusiastic crop who decide that the war will be a lot of fun. The old birds, who know it won't be, are too old to go anyhow. And when the war starts they have to shut up or they'll be shut up. What most of the old birds will do will be to discreetly wave a flag and cheer at stated intervals, meanwhile digging in commercially for all they're worth, and hoping the war won't stop until they've made their pile. Well, haven't they the right to do that? Weren't they the victims last time?

If Uncle Cuthbert was right (and he never missed on a hoopskirt), another great war is inevitable. Then why not have it now, when we have time for anything, and no money to travel anywhere, unless free on a transport? In an endeavor to have it, the sooner to have over with it, I offer the following helpful suggestions:

Send Smedley Butler over as ambassador to Italy where he and Mussolini can really get together. Send Hamilton Fish as ambassador and red herring expert to Soviet Russia. Don't give the Filipinos their independence; keep the islands until Japan has time to collect them from us.

(Continued on following page)

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(Continued from preceding page)

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By the way—Happy New Year!—Who threw that brick!

### AIR—HOT AND OTHERWISE

(Continued from page 28)

Anti-aircraft guns during the Great War never did such sanguinary execution against attacking escadrilles as now is being done against the whole American aircraft industry by the artillery salvos and snipers down in Washington. As I write, the air mail operators are convened there at the demand of Postmaster General Brown to find ways and means of cutting existing contract figures so as to save \$600,000.

All these things surely emphasize the necessity for an organized effort not only on the part of the industry itself but of the many thousands not directly allied thereto but nevertheless logically intensely interested in the development of aviation in America.

A mass demand MUST be made on Congress to put back the appropriations asked for by both the Bureau of Aeronautics and the Army Air Corps and to give sufficient moneys to fully develop the air mail. Proof of the necessity for these appropriations will be presented to the committees to which these matters have been referred, but the most effective arguments will be proper appeals by interested and informed persons to the Senators and Congressmen representing their own states.

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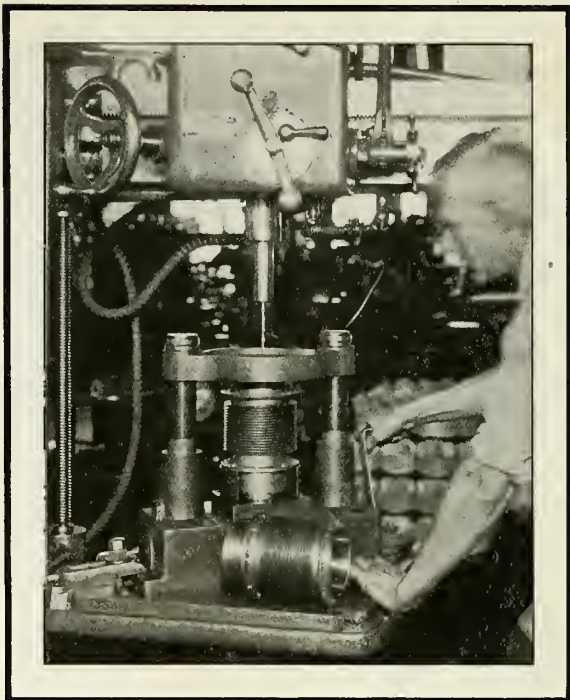
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Hartshorn Tie Rods were used on the plane which Mr. and Mrs. Charles Healey Day built and in which they just completed a tour of the world.

## HAVE WE FORGOTTEN THE WORLD WAR?

(Continued from page 27)

Making fliers is not comparable to training ground troops. It takes at least six months of intensive training to make a fair infantryman. It requires a year to train a military flier, at the very minimum. Of course we couldn't train many in the first year after war was declared for we should first be required to build the planes in which to train. The first year would be consumed in building training planes, the second year in training fliers and producing fighting planes. In any major action the war would be over before those two years elapsed.

Here is something to which we should give careful consideration: Man-power isn't the deciding factor in warfare any more. We live in a chemical and mechanical age. Many of these machines, operated by a single man, can destroy thousands of men in a single day.

We have only to look to the Far East to see what preparation means. The dominance of the Little Flower Kingdom with her seventy millions, over sluggish China's hundreds of millions, is all the evidence we need.

The size and intelligence of the individual soldier can be largely discounted in future wars. The balance will swing to the side which has the best equipment, first. And this is especially true of aircraft and aircraft armament.

The only reason advanced to justify our program of disarmament is "for economy." A little reflection will point to the fallacy of this reasoning. Public money spent on armament goes right back into circulation. It would go to steel mills, cotton mills, gun factories, munitions plants—providing work for thousands of workmen now unemployed. If our present economic distress comes from hoarding, the logical way to break that up is to collect taxes and distribute the money to the whole country through its workmen.

I will, of course, be charged with militaristic ideas, with being a Big Army man. General Hanson Ely well said, "No soldier favors war. The greatest lovers of peace are our fighting men." Why? Because the soldier represents one organized group which must lose. I know of no soldier who gained a dollar from the last war, but thousands of them gave their lives.

Every true military man is hoping and praying for peace. If war comes, he must leave his home, his family, and go out to a cold, uncertain fate. And, if he is an American soldier, he well knows that he has little chance of returning. If United States troops in the next war are poorly-armed, outnumbered and hastily organized, there is little hope for anything but annihilation for them.

Soldiers know that the only way to postpone the next war is to be ready for it. No nation ever attacked a prepared foe. Had either either England, France or the United States possessed the military strength of Germany in 1914, the World War would never have begun.

*This is the first of a series of articles on National Defense by Major General James E. Fechet, U. S. Army (Ret.). These articles will appear exclusively in AERO DIGEST each month.*



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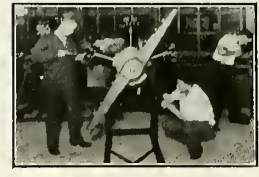
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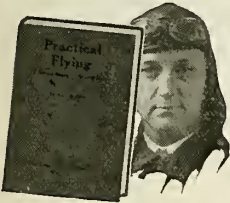


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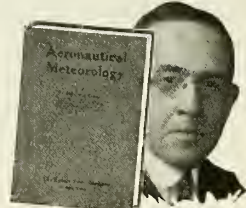


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# OUR READERS AIR THEIR VIEWS

**Dennis F. Cashman, suggests a trophy for ocean flying to develop trans-Atlantic service:**

Now that the Schneider Trophy has passed into the hands of Great Britain and that nation, for the present at least, is supreme in the realms of speed, might I suggest that a cup for the development of long distance flying boats would go a long way to bring about a commercial air service from Newfoundland to Ireland.

Some of our wealthy Irish-Americans could do both countries and aviation in general a real service by offering a trophy for a round-trip crossing over the Ireland-Newfoundland route.

I would suggest that the event be held each year, with the flight starting one year from Newfoundland and the next from Ireland. Points could be given for various qualifications, such as comfort, air and sea worthiness, radio navigation. The project seems to me one thoroughly worth sponsoring.

**H. Spry Leverton, aerodrome manager at Croydon for K. L. M., gives evidence of the careful way his airline is managed:**

I read Mr. Paul Goldsborough's article in your November issue entitled "Are European Airlines Better Than Those of the United States?" with great interest, but upon one point some misapprehensions seem to have occurred.

Referring to his trip by Scandinavian Air Express from Croydon to Copenhagen, Mr. Goldsborough writes, "The attendants (of the K. L. M. Royal Dutch Airlines at Croydon) weighed both my baggage and myself, but ignored the fact that the total was about twenty pounds overweight."

I wish to quote from my firm's records the exact figures for the day and aircraft on which Mr. Goldsborough traveled. Mr. Goldsborough's personal weight was 78 kilos, and his baggage was 13 kilos in weight. As we allow 15 kilos free baggage per passenger, he had to pay no excess. These weights, both personal and baggage, were entered according to routine, on two official documents which accompany each machine, the Passenger and Baggage Sheet and the K. L. M. Load List. On these every ounce of payload in invariably entered, and these documents check each other. I enclose copies of these for the actual flight under discussion.

Maximum loads are officially fixed by the Dutch Government Aeronautical Inspection Department, one of the strictest

Departments of its nature in existence, and are also given on load list above the total payload carried on a flight. No machine of the K. L. M. has left this airport since I have been manager (over ten years) without the documents described duly signed by the pilot of the airplane and the manager or his representative.

**Don Alexander, president of the Alexander Aircraft Company, cheers the slow-landing plane as the hope of wide-spread private flying:**

An encouraging trend in commercial aviation is the steady return back to slow-landing training ships by schools.

Is twice as easy to land a plane at 30 miles an hour as one at 40 miles an hour. A human being does not experience the bewilderment at 30 that 40 miles an hour will induce. A forty-mile-an-hour landing speed means usually a 65-mile-an-hour speed while rounding out the glide close to the ground. No wonder it makes landing an ordinary plane look difficult.

The middle aged and well-to-do business and professional men offer the best market for private planes. They have the money, as a rule, and many of them have the enthusiasm. But at middle-age most persons, like dogs, lose confidence in their ability to learn new tricks. If they step into a baby plane and find that it floats into a natural landing at about the same speed that they pull up at the home curb in their cars for dinner, their confidence begins to grow.

The baby ship and slow-landings are pointing the only logical way toward more students and more sales.

**Norman Anderson, manager of passenger traffic for Airtech Flying Service, gives a few hints on flight selling:**

Selling aviation is a job of salesmanship—nothing else—and the salesman must study his customers. We of Airtech Flying Service do so and are getting the business the home airports of our customers should get. We have carried more than 7,000 passengers for sight-seeing flights over the city in twelve months.

Aviation today is a commodity more saleable than ever but it requires new methods. In the first place, aviation must be sold not as a novelty or an infant business in swaddling clothes, but as a fast and safe form of transportation. To this end, it is to the advantage of

every operator to sell, not only his concern, but that of his competitors as well. He must help keep planes—anybody's planes—in the air.

A second essential is an understanding of the new appeal of flight. All pilots know that a flight is like a tonic. They know that a person steps from the plane all pepped up; they say it revitalizes them. We sell aviation as a stimulant.

We sell safety. We have a record of which we are proud and we make the most of it. Any airport can sell safety, but to do it its personnel must stop stunting, stop getting over the city and showing off.

Scenery is another of the strong selling points. Every man and woman is proud of the scenery around the home town, but very few airport managers attempt to sell it.

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**A loyal Briton, R. E. Nicoll of Canada, rallies to the defense of British planes and devices:**

In your November issue, Mr. Woodie Kane has something to say about British commercial aircraft. Aircraft cannot always be judged by their looks. Because America favors the monoplane type, it does not mean that the biplane type is obsolete. There is much to be said for both, the balance probably weighing in favor of the biplane for general efficiency.

It is admitted that American transport planes are faster than British, but it would be interesting to see if Mr. Kane can produce figures of any American commercial aircraft that will equal the performance of certain British planes, say the four-engined biplanes used by Imperial Airways.

Mr. Kane also makes some rather irrelevant remarks regarding the Handley Page slotted wing. His characterization of this device as a "darn nuisance" in America would seem to be a somewhat sweeping statement in view of the fact that they have scarcely been tried in practice there. It might be worth Mr. Kane's time to investigate tests in various countries and to read the report No. 398 of his own N. A. C. A. on the device.

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**STINSON JUNIOR, J-6-5;** privately owned, kept in hangar; 200 hours. Licensed October 11, 1931. Ready to fly away. \$2,500. H. G. Beck, Manly, Iowa.

**SACRIFICE SALE:** J-5 Straight Wing Whirlwind Waco, licensed and in perfect condition. Ship is well streamlined and plenty fast. Priced to sell quick, \$1750. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**FOR SALE:** New model Anzani 3 cylinder, 35 horsepower engine, only 20 hours. Dual ignition, special built hub. First \$250 or best offer. Lavern F. Kowalke, Wall Lake, Iowa.

**MONOCOUCPE,** Velle engine, relicensed; split landing gear, lights, instruments, duals, etc., \$700. John Warren, 43 Walnut Street, Belleville, N. J.; Phone Belleville 2-3662.

**CESSNA,** Warner motor, 4-place, excellent condition. Bendix wheels and brakes, tail wheel, new tires, new style navigation lights, all instruments, including turn and bank, rate of climb indicators and Pioneer Straightway compass. Price \$1,550. K. Russell Smith, 394 Wyoming Avenue, Wyoming, Penna.

**NEWLY RELICENSED 1930 Kinner American Eagle.** Like new; never damaged. Heywood starter, steel prop. \$950 cash. Excellent OX-5 motor, \$75. Act quick. Hanson Airport, Youngstown, Ohio.

**FAIRCHILD 21B,** 125 h.p. Kinner powered. Equipped with Townsend ring, wheel pants, streamlined undercarriage, wings faired at fuselage, removable cowling on front cockpit, semi-hallons with brakes, dual controls and complete set of instruments. Ship like new, less than 100 hours time. Price \$2,500. Ralph Wilson, Stony Brook, L. I., N. Y.

**FOR SALE:** Monocoupe, Velle powered; licensed. Complete with compass and duals. Never cracked. Price \$550. Irving Wolff, RCA Victor Company, Inc., Camden, N. J.

**BUHL BULL PUP demonstrator.** Perfect condition. New motor. Never cracked. Special paint. Air wheels. \$900. Northeastern Air Service, Bridgeport Airport, Stratford, Conn.

**FOR SALE:** OX-5 two-place monoplane. No reasonable offer refused. Not licensed. Will trade for single place flying. H. H. Brindley, Peabody, Kansas.

**FOR QUICK SALE:** A real buy; Kari-Keen two place side by side cabin ship, powered with 90 h.p. Lambert motor. Ship is equipped with balloon tires and brakes. No reasonable offer refused. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**WARNER POWERED BIRD,** latest model. Equipped with starter, steel propeller, Townsend ring. A bargain and priced to sell. Warner Aircraft Corporation, Detroit, Michigan.

**CURTISS ROBIN, NC-8397,** 300 hours total time. Millerized OX-5, valve action like new, Hamilton Steel prop, with spinner, Scintilla magneto, Bosch booster, dual controls, 30 x 5 faired wheels. Hangared at Red Bank. \$700 or best offer. P. H. Betts, Belmar, N. J.

**FOR SALE:** Bird OX-5, just relicensed; in fine condition, motor just overhauled, Millerized, air wheels, new propeller. \$900. Fred McKenrick, Ebensburg, Penna.

**FOR SALE:** Waco \$235. Airplanes bought, sold and traded. Write your needs or send 10c for list. Pioneer Used Airplane Exchange, Airport, Syracuse, N. Y.

**AVRO AVIAN, MARK III** Cirrus motor, NC license, \$1,000. Whittelsey Avian, new Cirrus motor; complete overhaul; licensed, \$1,000. Northeastern Air Service, Inc., Bridgeport, Conn.

**FOR SALE:** Practically new GXE Waco, OX-5 Millerized; steel prop, Bendix wheels and brakes, new Irvin silk parachute. Free instruction and coaching for desired license. \$1,200. I. M. Tull, Jr., Chapel Hill, North Carolina.

**FOR SALE OR TRADE:** 1 Hisso Canuck; 1 Le Rhone Avro; 1 Gnome special. Charles L. Braden, 635 Porter Street, Gary, Indiana.

**GREAT LAKES 2T 1A,** Cirrus, 197 hours. Dual controls, perfect shape. Complete set Pioneer instruments, compass, bank & turn indicator, level flight indicator, air speed indicator, bank indicator, navigation pad, fire extinguisher, first aid kit, altimeter, tachometer, oil pressure gauge, temperature gauge, and many extra engine parts. 40 hours since last overhaul. NC license. \$1600 cash. Fred Gruss, Port Jervis Airport, Port Jervis, N. Y.

**FOR SALE:** A bargain. Waco Model F, powered with a Warner 110 h.p. motor. This ship is in excellent condition, equipped with Heywood Air Starter and Standard Steel propeller. Write or wire us your best proposition. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**LINCOLN-PAGE:** Licensed; 150 h.p. Hisso, 20 hours; ship 125 hours, \$800. Hangared at Elm-hurst, Ill. Merrill McGawn, 2158 N. Sayre Avenue, Chicago, Ill.

**SWALLOW TP, OX-5, NC8771.** Plane like new. Motor completely overhauled and Millerized. Will sell or trade for licensed light plane. Stanley Butte, P. O. Box 670, Biloxi, Miss.

**SENENICH HENDERSON,** deep crankcase, tachometer drive, lift camshaft, Thompson pistons and valves, Eiseman Magneto, Zenith carburetor. Hardwood, metal-tipped propeller. Guaranteed perfect shape; turns up fine; now in Heath; 5 hours. \$150. James S. Cox, Flemingsburg, Kentucky.

**FOR SALE:** Two American Cirrus upright motors; one new, one used. Brown Metalplane Co., Spokane, Washington.

**NB3 BARLING, LeBlond 60;** licensed. First class condition. Motor overhauled. Air wheels. Always hangared. Price \$1,000. Write Northeastern Air Service, Inc., Bridgeport, Conn.

**OX Laird rebuilt,** finished your color, suitable for racing, \$1250. Waco 90 rebuilt, finished your color, \$1000. Waco 10, A-1, N.C., never cracked, \$650. Dayton Bear Standard, new throughout, \$400; less motor, \$250. Cirrus motor, \$150; J-6 Whirlwind 300, less mags and carburetor, \$650. Converted Lawrence with prop, \$75; OX-5 motors, \$125. Waco 10 parts. Set D. H. Wings, \$50. Legion Air Service, Chicago Heights, Ill.

**NEW LAMBERT 90 MONOCOUCPE;** licensed, balloon wheels, brakes, extra instruments. Cost \$3600. Must sell immediately. Best offer over \$2000 takes it. Diamond Airport, 519 West Summit Avenue, San Antonio, Texas.

**SACRIFICE CAVALIER "NINETY";** NC license, perfect condition, special instruments, metal propeller, Townsend ring, airwheels and heater. Cost \$3650; sell, \$1250, cash only. C. F. Williams, Miami, Oklahoma.

**FOR SALE:** New 60 H.P. LeBlond engine still in original case from factory, \$250. Gorman Aero Sales, 2262-59th Street, Brooklyn, N. Y.

**EAGLEROCK OX-5, A-1 condition.** Motor completely overhauled, turning 1500. Brand new wheels, tires, Hamilton propeller. \$475. Need money. R. Crete, 1602 Pennsylvania, Marysville, Michigan.

**FOR SALE:** Monocoupe, A-1 condition, licensed until September 1932. Has new Velle motor with less than 20 hours. Will sacrifice for \$650. John G. Tull, Kinston, North Carolina.

**TRAVEL AIR, OX5,** licensed to October 1932, perfect condition throughout. This Travel Air will have to be seen to be appreciated. Time payments to responsible buyers. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**THIRTY NEW AND USED AIRPLANES:** Sensational sale. Write for Free list of bargains. Moth, \$1100; Challenger Robin, \$1350; Kinner Cabin, \$1150; Western Airplane Sales, 602 Graphic Arts Building, Kansas City, Missouri.

**WARNER-FLEET,** licensed until November 1932; A-1 condition; \$1300. Also OX-6 identified Waco 10, with new covering. Write Box 94, Petersburg, Va.

**185 H.P. CHALLENGER ROBIN,** special job de luxe, recovered and painted at Verville factory. Heywood starter, tail wheel, complete instruments. Engine complete major overhaul 40 hours ago at Capt. C. M. Never cracked, always privately owned and kept in hangar. Best Robin in the country. \$2450. Dr. J. R. Bolansy, 2119 E. Jefferson, Detroit, Michigan. Phone Fitzroy 0253.

**FOR SALE:** Brand new OX-5 motor complete with new magneto, \$225. One pair 30 x 5 Bendix wheels, brakes and tires, \$75. Series 2000, OX-5 Travel Air, licensed and in perfect shape, \$800. Series 4000 J-5 Travel Air, with new balloon tires and brakes, Townsend ring, \$3,500. Reason for selling, buying larger ship. All items guaranteed perfect. L. E. Reel, Forest Hill, Louisiana.

**OX6 AMERICAN EAGLE, NC License.** Only flown ten hours since recover and overhaul. \$500 cash. Can demonstrate. Northeastern Air Service, Inc., Bridgeport, Conn.

**HEATH PARASOL,** 1931 model, welded construction, 16x4 wheels. Henderson conversion parts and handwood propellers. Reasonable. List for stamp. Zander, P. O. Box 82, Michigan City, Indiana.

**USED AIRPLANES** at bargain prices. Licensed, perfect condition Wacos, Buhrs, Fairchilds, Monocoups, Moths, Aerocnas; \$700 to \$1,800. Write for our list. Aircraft Brokerage & Finance Co., 205 W. Wacker Drive, Room 200, Chicago, Illinois.

**FOR SALE:** OX-5 Travel Air Model 2000; 50 hours. Bought new in September. Perfect condition. Cheap at \$1,250. Jules Alexander, Indiana Theatre, Marion, Ind.

**SPECIAL KEMP-HENDERSON:** Deep sump, air scoop and tack drive; 30 horsepower. Perfect condition. Ninety-five dollars, complete with five-foot prop. Les Long, Cornelius, Oregon.

**OX-5 TRAVEL AIR 2000,** just recovered; new semi-air wheels; eight hours on motor since top overhaul; Scintilla Magneto; Millerized; Standard Steel propeller; N. C. licensed. Also extra motor with 150 hours; Scintilla Magneto. Price \$850, complete. M. K. Porter, 625 Emerson Avenue, Elizabeth, N. J.

**MUST SELL AERONCA** two-place. Ship and motor perfect. Just refurbished. Motor nearly new. Best offer over \$1000. New Aeronca two-place, less than 20 hours. Best offer over \$1200 takes it. Aeronca Southern Sales and Service, Municipal Airport, Houston, Texas.

**FOR SALE:** Ryan B-1, just relicensed and in excellent shape. Best offer takes it. Will take good OX job as part payment. Address AERO DIGEST, Box 1254.

**NEW STANDARD, J-5,** five-place job. Very little time, one year old. Cannot be told from new. Cost \$9775. Sacrifice for \$3,000. Any demonstration. Emil Roth, Jr., Fayetteville, N. Y.

**FOR SALE:** Golden Eagle Chief, LeBlond 90, used only as demonstrator. Perfect condition. \$2500 cash. Seagle Flying Service, Hickory, North Carolina.

**FOR SALE:** OX-5 Bird, in excellent condition, licensed to Sept. 19, 1932. Air wheels, dual controls, 136 hours. Price \$1200. Free instruction. Anthony Hanzlik, 33-05-37th Avenue, Long Island City, N. Y.

## PARACHUTES

FOR SALE: 24 foot silk Irvin seat pack chute. Practically brand new; factory packed; never jumped. Cost \$375. \$200 takes it. Kenneth Parker, Janesville, Wisconsin.

PARACHUTES: Approved type. Seat, back, lap and chest, bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloons furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

FOR SALE: 2 exhibition outfits, Russell, all silk, 28 foot back pack, 24 foot chest pack; practically new. Sacrifice for \$200 each. 2 Irving seat packs, 24 foot silk, \$125 each. 1 Russell seat pack, silk, 24 foot, \$100. Emil Roth, Jr., Fayetteville, N. Y.

## WANTED

WANTED: J-5 Waco, either straight or taper wing job, preferably less motor. Will pay cash, must be bargain. Write or wire Glen W. Fellows, 1406 Union & Peoples National Bank Building, Jackson, Michigan.

WANTED: International fuselage, for OX-5 motor mounting. Model F-17. Also radiator for OX-5 for International to fit underneath. Must be in good condition and cheap. Theodore Ledford, 219 North Eighth St., Hamilton, Ohio.

WILL TRADE house and lot in St. Petersburg, Florida, for open or cabin ship; air-cooled motor. D. Tennant, Lake City, Minnesota.

WANTED: Will pay cash for used Aeromarine Klemm powered with Salamson AD 8. Must license with recover job and motor work. AERO DIGEST, Box 1247.

WANTED: Late 1930 or 1931 model Lymcoming Stinson Junior. Price must be right for cash. Full details in first letter. Harry Potter, Bismarck, No. Dak.

WANTED: Light plane engine of 30 h.p. or over in good condition. No conversions. Floyd F. Brown, 2338 Humboldt Street, Bellingham, Washington.

WE WANT TO BUY any type or make of magnets, preferably Scintillas. Tell us what you have and the lowest price you will accept for same. Chares Stern & Co., 817 W. Washington St., Chicago, Ill.

WANTED: One set pontoons and struts for OX-5 Waco 10, private plane. Must be cheap. No junk. Write Pat Williams, Wevaco, West Virginia.

WILL TRADE late Stutz Blackhawk 2 passenger Torpedo Roadster, 100 miles per hour, cost new \$3195, on good 2 or 3 passenger plane. Telephone 2-2317, Paul Peterson, 2501 Union Avenue, Altoona, Pennsylvania.

WANTED: Waco 9 or OX Bird. Must be priced right for quick cash sale. Outside condition immaterial. Jack Frenz, 215 N. Morrison, Appleton, Wisconsin.

WILL TRADE licensed Velis "60" Monocoupe, one year old, time 175 hours, perfect condition, for licensed J-5, 6-place Stinson or Ryan Brougham. Box No. 523, Bismarck, N. Dak.

WANTED: Henderson four-cylinder motorcycle in trade for 36-foot primary glider, less covering. Write D. Van Schaick, P. O. Box 38, Scarsdale, N. Y.

WANTED: Chassis Vee with fairing for right side of 6000 B Travel Air undercarriage. Must have Department of Commerce approval. Allentown Aviation Corp., Allentown, Penna.

CASH for J-6-5, Hissos, 4 cylinder in line or "what have you?" and modern wrecked ships. Roker, 208 McKinzie, Fort Wayne, Indiana.

WILL SELL OR TRADE, for Aerona or what have you, new Church Midwing, air wheels, welded fuselage, empennage, etc., with Heath B-4 motor, complete except covering; also slightly damaged Heath parasol and motor. Wright-Pugsley Co., Foot of Third St., Duhque, Iowa.

WANTED: Used, licensed, 3-place cabin monoplane, Not OX, A-1 condition. Must be reasonable for cash. Earl Gustafson, 602 Carney Blvd., Marinette, Wisconsin.

## HELP WANTED AND MISCELLANEOUS

AGENTS, MECHANICS SOAP. Cleans greasy hands immediately. Dozen cans, \$1.50. Mechanics Soap Co., 1610 Knapp, St. Louis, Missouri.

FOR AIRCRAFT INDUSTRIES: Improved site, approximately one mile square, in this vicinity; specifically adapted to the successful operation of every branch of aircraft industry due to commercial, industrial and natural advantages it possesses; photograph and data forwarded upon request; 5 years free taxes. Ed. Lea Davis, Flat-iron Bldg., Chattanooga, Tennessee.

WANTED: Aeronautical engineer. Must be good on airplane stress analysis. A new organization just starting. State your past experience. AERO DIGEST, Box 1246.

WANTED: PARTNER. German, designer of a motorless airplane (ornithopter), would like to meet some gentleman who would be willing to indorse construction of same. Investment needed, \$2,000 to \$3,000. AERO DIGEST, Box 1248.

AGENTS & DEALERS WANTED for sure selling, propeller design, collar and tie clips and ladies' bar pin. Send \$1 for sample and money making proposition. Delmar Specialty Co., Delaware Trust Building, Wilmington, Delaware.

CHUTE JUMPER with equipment. Salary and opportunity to fly. Can make good money if willing to work. Girl preferred. State particulars at once. Box 1183, Daytona Beach, Fla.

## MODELS &amp; GLIDERS

FOR SALE: A new glider. A real job. C. Elliott, Shelby, Michigan.

EXPERIENCED GLIDER BUILDERS will build glider or lightplane which is on market in kits. If reasonable, your terms are acceptable. Write Elmer Lundquist, Moscow, Idaho.

BEAUTIFUL 20" scale reduction models of the Curtiss Falcon army attack plane. Mounted as a radio or mantel art-piece. Reasonable prices. Photograph 10c. Victor Stanzel, Schulenburg, Texas.

## PATENTS AND INVENTIONS

INVENTOR'S UNIVERSAL EDUCATOR. Contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dieterich Co., 602-C, Ouray Building, Washington, D. C.

## FOR SALE

FOR SALE: Cheap; Like new Ryan B-1 gas tanks, wing struts, Bendix wheels and brakes. C. Schneider, 5032 Hurlbut Avenue, Detroit, Mich.

FOR SALE: Supreme Wood Propellers for Kinner, Warner, etc., \$25.00; Standard Steel Sport Senior Propellers, 7" and 8" diameters, \$160.00; 24 x 4 Kelsey Hayes Wire Wheels, \$10.00; 26 x 5 Goodrich Tires, \$7.00; Tubes, \$1.35. Above parts all brand new. Used 22 x 10 Airwheels complete with tire, tube and hub, \$25.00 each. Address Service Manager, Fleet Aircraft Corp., Buffalo, N. Y.

BARGAINS IN MOTORS, propellers and hubs for light planes, iceboats, snowsleds, Indians with propellers, \$35 to \$50. Propellers, \$5. Fords and Chevrolets with propellers, \$50 to \$75. Propellers, \$12. Hubs, \$5. Flying Flivvers, \$650. Blueprinters, \$5. Circulars, 10¢. Storms Aviation Co., Spartanburg, S. C.

BINOCULARS, FIELD GLASSES, TELESCOPES: Slightly used, \$1.75 up; 8x prism binoculars, \$11.00. All makes. DuMaurier, Busch, Lemaire, Colmont, Megaphos, etc., 3 to 24 power. World's largest assortment. Catalog free. DuMaurier, Importers, Dept. 71A, Elmira, New York.

PARTLY ASSEMBLED light airplane, professional work. Welded steel tube fuselage, empennage, landing gear complete, turtleback, part cowling, tank, controls, 4-wing panels, double drag braced; extra wire, turnbuckles, bolts, tubing, spars, etc. First \$150 takes. Dilley, 1510 Armstrong, Kansas City, Kansas.

FOR SALE: Licensed J-6-5 Travel Air, almost like new, airwheels, \$1350. Licensed Avro Avian, airwheels, \$600. Switlik silk parachute, one year old \$130. One pair 30 x 5 Bendix wheels with brakes, tires and tubes, perfect condition, \$40. Tred Avon Flying Service, Inc., Easton, Maryland.

CRACKED ARROW SPORT, LeBlond, 60 motor. Only \$300 for ship and motor, or will sell parts cheap. Diamond Airport, 519 West Summit Ave., San Antonio, Texas.

MAGNETOS, ALTIMETERS, TACHOMETERS—For expert repair and testing of any instruments or electrical apparatus, send them to Streed Elec. Co., 1312 Harmon Place, Minneapolis, Minnesota.

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ENGINEER connected with Aviation fourteen years, who was overseas with it during war, then learned the engine design methods of McCook Field, and has done engine design for best known companies; who has held position of chief engineer, developing light plane engine now used by Army, wants position involving originality and responsible guidance of engine development. AERO DIGEST, Box 1237.

TRANSPORT PILOT with all ratings. Over 4200 certified hours, both day and night. Every type flying experience. A & E license; college graduate. Will go anywhere. Flown over most of North America. References. Write, Pilot, 16 Ridge-way Avenue, Oaklyn, N. J.

LICENSED MECHANIC wants position. Good trouble shooter on air or water-cooled engines. Dependable worker. W. E. Knudson, White Rock, So. Dak.

PARACHUTE JUMPER with parachute, 20, desires position with barnstormer as aerial performer. Will work very hard for a living and experience. AERO DIGEST, Box 1249.

TRANSPORT PILOT, mechanic; 550 hours safe, sensible flying on all types. Standard to Stinson. Instruction, cross country, barnstorming, airline experience. No crack-ups. Best references. Age 24, single. Steady employment more important than large salary. Go anywhere and fly anything licensed. Robert M. Norris, Marquette, Kansas.

L. C. PILOT, A. & E. mechanic, 194 air hours, 14 years' experience as automobile mechanic, will work at both. AERO DIGEST, Box 1252.

ENGINEER AND CONSTRUCTOR, experienced design and working of spot-welded stainless steel on seaplanes, all surfaces, etc.; available short notice. AERO DIGEST, Box 1251.

YOUNG MAN, 19, trained in airplane and engine mechanics, also welding, wishes starting position in industry. Vincent Alekna, 627 West 18th St., Chicago, Illinois.

TRANSPORT PILOT; open and closed ratings; co-pilot time on trimotor, approved school. Single, age 20. Salary secondary. Fremont C. Rohrer, Cochrane, Wisconsin.

GIRL, single, 2 1/2 years college, experienced stenographer and social worker, excellent references. Interested in aviation, wishes position offering opportunity to learn to fly. Address AERO DIGEST, Box 1250.

FILIPINO, STUDENT PILOT, desires aviation connection to keep up studies. Chauffeur, cinematographer. Domestic or commercial. Good references. Marciano Sonido Trocio, 153 Eighth Avenue, New York City.

TRANSPORT PILOT, 250 hours, open and closed to 3500, clean record, photographic experience, single, will travel. Recommendations. Howard Lane, Brattleboro, Vermont.

TRANSPORT PILOT: 6,000 hours, fourteen years' flying. Open and closed rating. Prefer private flying or instruction. Best references. Will go anywhere. AERO DIGEST, Box 1253.

PILOT WITH OWN SHIP, 3 place Wright Whirlwind job. Will accept any paying proposition. Will go anywhere. Best references. What have you to offer? AERO DIGEST, Box 1255.

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## DO YOU KNOW WHY CLASSIFIED ADVERTISING IN AERO DIGEST PAYS SO WELL



**T**HIS letter from Mr. F. M. Swengel, an AERO DIGEST subscriber, tells the answer. "It may interest you to know that I found AERO DIGEST the most popular aviation magazine among the crowd that is usually hanging around the restaurant at Municipal Airport here. The persons I refer to are all connected in some way with either commercial or private aviation and most of the ones I talked to were rooting for more magazines of the Aerodig type.

"I shall take this opportunity to thank you for your courtesy in changing the address of my copy and to thank you for publishing such an excellent magazine."

If you will notice, AERO DIGEST publishes more classified advertising than any other aviation magazine. Use it to advertise anything aeronautical. The cost is only 10c per word, with a minimum charge of \$2.50. Forms for February classified advertising close January twenty-third.

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Productions*

NEW YORK CITY

December 23, 1931

Aero Digest  
220 West 42nd Street  
New York

Gentlemen:

I wish to inform you that The Aristocrat that I advertised for sale in your magazine was sold the week after I inserted the Ad. I had no idea that I would obtain the results so fast. Have received 42 letters to date, and the party that bought the plane is a Mr. Parrish from Georgetown, South Carolina.

Thanking you for your co-operation, I am

Respectfully,  
(Signed) SAMPSON HELD

MANUFACTURER OF PROGRESSIVE AIRCRAFT FINISHES



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**B**ERRY BROTHERS has developed an entirely new and vastly superior method of finishing the plywood surfaces of airplanes. It is known as the Balloon-Fabric Pigmented-Dope System—and in simplicity of application and durability is absolutely revolutionary.

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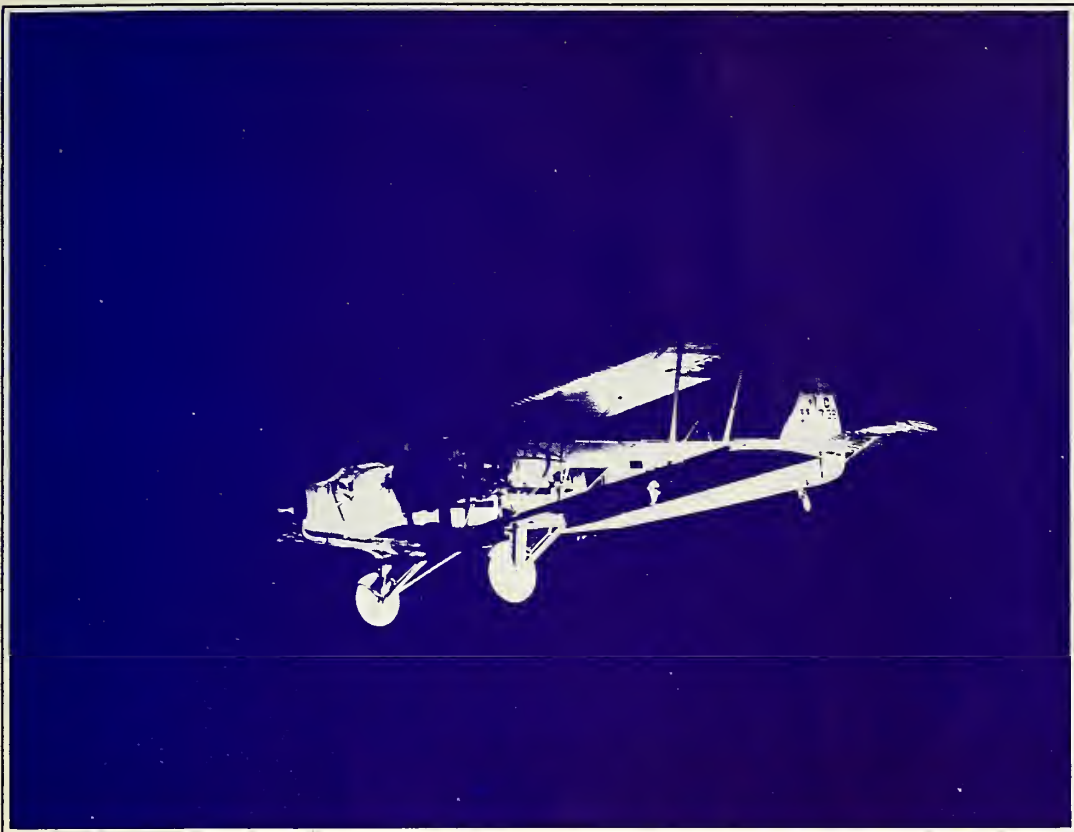
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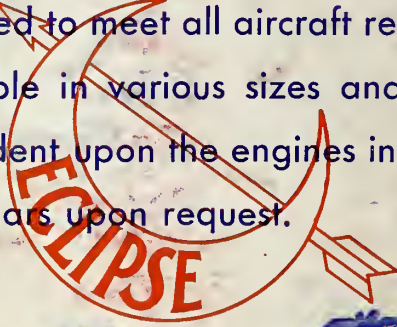
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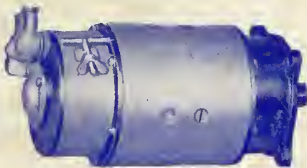
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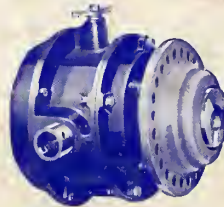
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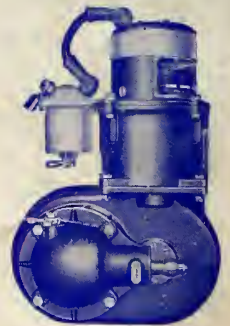
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East Orange, New Jersey

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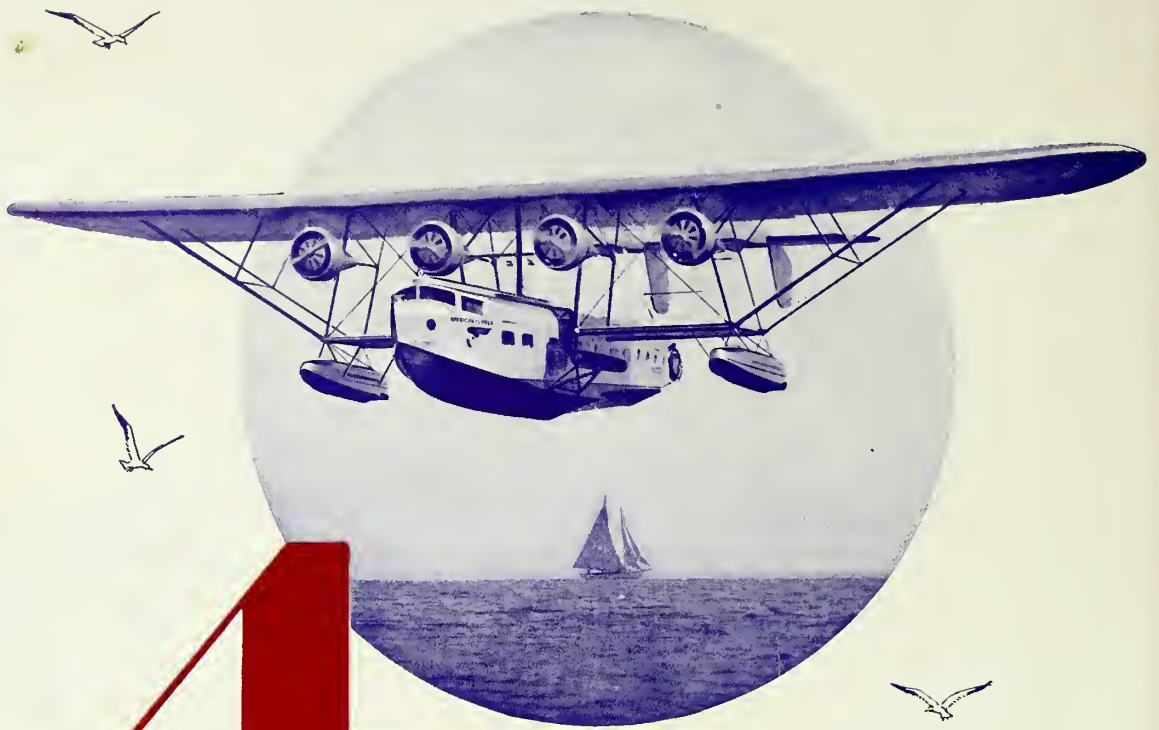
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Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, P.Q.; in Germany by Bavarian Motor Works, Munich; in Japan by Nakajima Aircraft Works, Tokyo.

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<b>Class of Service</b> <small>This is a full-time flying school. The only instructor is the pilot. He is a member of the National Aero Club and has flown for several years. He is a member of the National Aero Club and has flown for several years. He is a member of the National Aero Club and has flown for several years.</small>	<b>SIGNS</b> <small>All in the name of the National Aero Club. The only instructor is the pilot. He is a member of the National Aero Club and has flown for several years. He is a member of the National Aero Club and has flown for several years.</small>
<small>The following is a list of the names of the members of the National Aero Club and their addresses. The names are given in alphabetical order. The addresses are given in full. The names are given in alphabetical order. The addresses are given in full.</small>	
<b>RECEIVED AT</b> #W43 52 NL-CHARLOTTE NCAR DEC 5	
<b>RUSSELL NICHOLAS:</b> PRES NICHOLAS BEAZLEY AIRPLANE CO MARSHALL MO:	
FLYING NB TRAINER MADE PERFECT TAKEOFF FLIGHTS AND LANDING WITH BOTH HANDS OVER MY HEAD BEFORE LARGE CROWD AT AL WILLIAMS BENEFIT AIR SHOW HERE TODAY BELIEVE THIS IS A RECORD STOP DO NOT KNOW OF ANOTHER MAKE PLANE THAT I WOULD TRY TO DUPLICATE THIS DEMONSTRATION IN CONGRATULATIONS	
MAILING NEWSPAPER VERIFICATION:	
JOHNNY CROWELL.	
919A.	
<small>THE QUICKEST EASIEST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAM OR CABLE.</small>	



This is an actual photograph of the flight described in the telegram . . . . . and shows Johnny Crowell, of Charlotte, N. C., our Carolinas distributor, taking off in the N-B TRAINER "HANDS OFF"



Here are all the comforts of a Cabin in the new detachable "Trainer Bonnet". Draft-free, but perfectly ventilated. Easy to enter—easy to leave. Can be installed



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Let us send you full details of the new improved 1932 Model NB-8 TRAINER, the most interesting airplane in America today for the operator or private owner, and

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AIRPLANE CO., INC.  
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EST. 1921

# In Gratitude, the Whole Wide World Over . . .

"I was in a jam. Got out. Landed safely."  
That's the short of it as flying men simply  
state their gratitude — for their lives — to  
IRVIN. No matter what the language, nor  
from what remote corner of the world it  
comes, they all breathe the same deep feeling.

## How they say it in Siamese:



### What it reads in English:

*Flying Fleet No. 1  
November 2nd, B.E. 2474*  
On September 22nd,  
1931 at 6 A. M. I was  
directing the flight of a  
fleet of 3 aeroplanes and  
I was in plane No. 2.

While controlling my  
plane to get in touch with  
the leading plane, the left  
wing of my plane got under  
the right wing of the  
leading plane. I made  
every effort to free my  
plane from the bound  
but in vain. The left  
wing of my plane had got  
into the right wing of the  
leading plane and it was  
therefore uncontrollable.  
I therefore jumped out  
of the plane with the  
help of Irvin parachute  
and landed safely from a  
height of approximately  
400 meters.

(signed)

Lt. Bjera Chooprayoon.

หลวงปู่ดั่งมิ 173

วันที่ ๒ พฤศจิกายน พ.ศ. ๒๔๗๔

เมื่อ ๒๒ ก.ย. ๒๔ ๗๔ เวลา ๐๖.๐๐ ข้าพเจ้าได้ขึ้นเครื่องบิน

ที่เมืองชุมพร ได้ขึ้นบินจากท่าอากาศยานชุมพร ๒ เครื่องบิน

ได้ขึ้นบิน ๓ เครื่องบิน ข้าพเจ้าได้ควบคุมเครื่องบิน

๒ เครื่องบิน เครื่องบินที่ ๒ ได้ขึ้นบินจากท่าอากาศยานชุมพร

ไปเมืองชุมพร ข้าพเจ้าได้ควบคุมเครื่องบิน

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More Than  
**500**  
Lives Saved

**Dear Friend:** If it ever comes to you in mid-air, we hope you too, will be prepared with your IRVIN Air Chute. We hope we may send you too, the little gold Caterpillar Club emblem such as is now on the ocean en route to far Siam to Lt. Chooprayoon. Trust your life in the air to an IRVIN AIR CHUTE and write us, for the one you need, today—

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“ . . . . We landed in the  
backyard of a farmhouse . . . ”

“To make a long story short, we finally passed over the Utica Airport and started on the last lap. The lights of Syracuse appeared and I cut north of the city direct for the airport. Suddenly the motor coughed and stopped completely out of gas. Embarrassing, to say the least. The ground below was absolutely black and it was impossible to distinguish whether we were going to land on trees, deserted houses or what have you. There being only one thing to do, I headed into the wind, and came down vertically 2,000 feet. We landed in the backyard of a farmhouse with no more shock than the average landing and without forward roll of an inch. The wheels landed in a one-foot ditch, which with any forward movement of the ship would have turned us over. Actually there was no damage done to the ship whatsoever. Had we been in an airplane without flares and landing lights, making contact with the ground at 50 or 60 miles an hour, the results would have been different, to say the least. Evidently we had run into 40 or 50 mile head winds.”

LESLIE B. COOPER (Kellett K-2 Autogiro)

Cross country, black-night flying is not common practice for the average Autogiro owner. But even though Mr. Cooper is a veteran airplane pilot he attributes his remarkable landing more to the inherent security of the Autogiro itself, than to his own flying skill.

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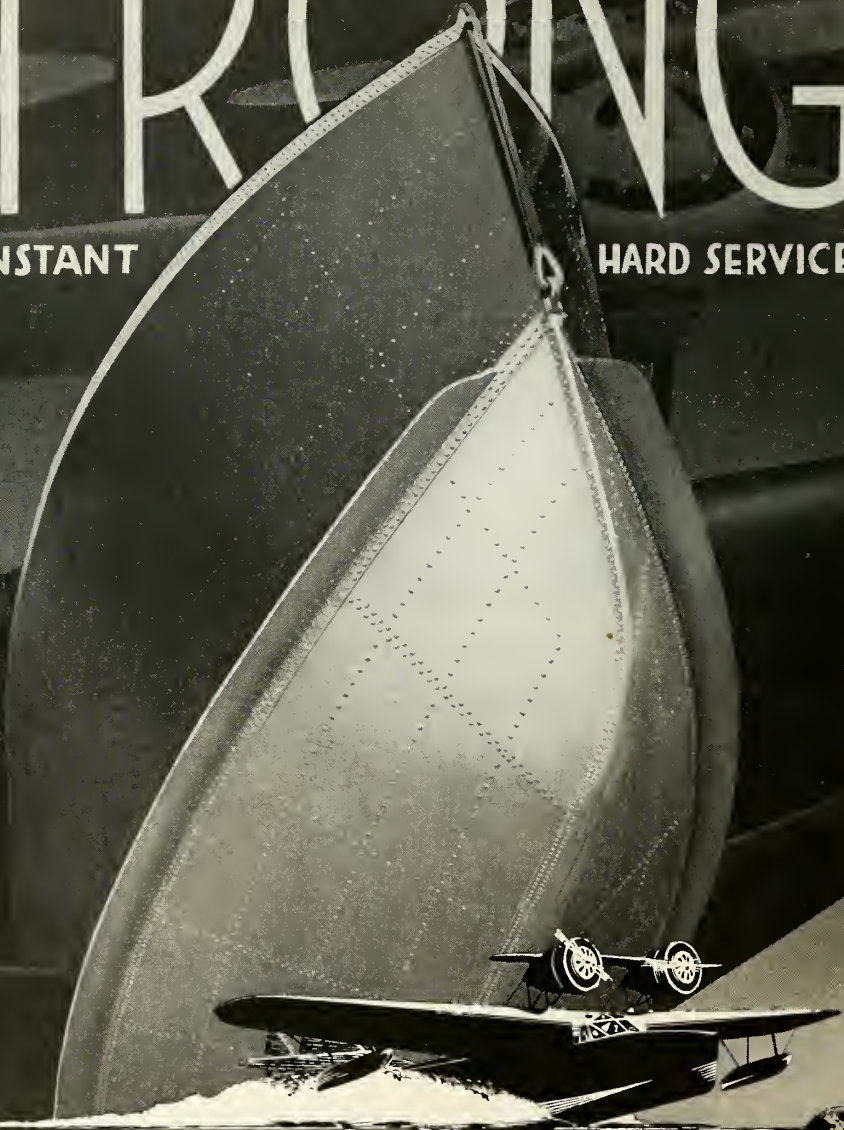


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*Amphibian*

## DOUGLAS



DOUGLAS AIRCRAFT COMPANY, INC. SANTA MONICA, CALIFORNIA



*"What's it to be,  
Son - just flying,  
or the  
AVIATION  
BUSINESS?"*



**F**LYING is both a sport and a job. But you've got to think about what you're going to make of your life. You've got to prepare yourself for a *business* . . . an objective toward which you can work with confidence that you've got a lifetime career ahead of you.

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that prepares you for business as well as flying . . . go to it."

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Section 2-AD

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*Very truly yours,  
(Signed) A. Schoepe."*

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# Announcing THE WACO "MODEL A"

...AN IDEAL AIRPLANE FOR THE PRIVATE FLYER  
WHO WANTS TO "GO PLACES AND DO THINGS"



● WACO is adding to its line for 1932 a two-place, side-by-side airplane designed *exclusively* for private flying. Feeling the pulse of the market, some months ago we determined that this was the sort of ship that was generally wanted. And advance showings have confirmed our diagnosis.

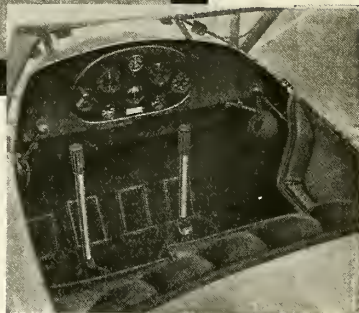
This is one airplane thoroughly adequate, in performance and in luggage provisions, for week-end trips. It is built for comfort, not for racing. It emphasizes the quick take-off and slow landing typical of previous WACOs, which make landing conditions immaterial. Its wide cockpit gives ample elbow room for two people, but with the intimate companionship that shortens time in the air. It has

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The "winter top," which gives closed-cabin comfort, is demountable in thirty minutes, if and when you prefer the feel and the freedom of the wide open spaces.

Power range, offered in a variety of motors, is from 100 h. p. to 165 h. p. with price range from \$3585 to \$4860, completely equipped, flyaway.

Truly this is a delightful airplane. Wouldn't you like to write for further details?



● The cockpit is snug yet roomy, well shielded, offers exceptional visibility, and has a demountable top as special equipment. Two large luggage compartments provide for 136 lbs. of personal effects when traveling. The unique system of brake controls introduced on the WACO "Model F" is carried over into the "Model A." Heywood starter is standard on all models.



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THE WACO AIRCRAFT COMPANY, TROY, OHIO



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by **Charles N. Monteith**, Chief Engineer, Boeing Airplane Co.; 3rd Edition revised by **Colonel C. C. Carter**, U. S. Military Academy, West Point. 211 illustrations, \$1.50.

This is the latest, revised edition of the famous introductory manual originally prepared in the Army Air Corps by expert specialists for the use of the West Point cadets, and now so popular as a first book on aerodynamics in universities and in ground and flying schools, and for home study by individuals. The material is not highly technical, and more than 200 diagrams, drawings and photographs are used to explain all points and make the book easily understood by those working alone. This is the famous manual you have heard so much about, the one that makes everything perfectly clear about airplanes; flight; engine principles; design factors; characteristics and types of airfoils; parasite resistance; component parts of an airplane; stability attainment; control surfaces; the propeller; airplane performance; dynamic loads; maneuverability and controllability; structural consideration; etc.; etc.

## Principles of Flight

by **Edward A. Stalker**, Head of the Department of Aeronautical Engineering, University of Michigan. 317 illustrations, \$6.00.

PROFESSOR STALKER supplies in this new book material that logically follows Monteith-Carter's "Simple Aerodynamics and the Airplane," for the use of students and for engineers who want to take the next step forward in aeronautical engineering. Principles of Flight is concerned chiefly with aerodynamics, but this subject is treated in connection with the dynamics of the airplane as represented by dynamic stability and by the spin. Under aerodynamics, all of the essential elements are developed—the theory of the monoplane; the multiplane; turning movements; the equations of flow for simple bodies; performance; and stability and control. The airscrew and the autogiro receive specific mention. As a preliminary to the study of dynamical stability and the spin, a development of the essentials of the motion of a rigid body is presented. A method of accurately estimating the dynamic stability from static stability tests is given. This method also has the advantage of giving a clear picture of the motions. At the end of each chapter there are many problems and questions, with much airfoil data to be used with them.

## Airplane Stress Analysis

by **Alexander Klemin**, director of the Daniel Guggenheim School of Aeronautics, New York University. 105 illustrations, \$7.00.

In this introductory treatise, Professor Klemin shows step by step how to make all the calculations in the airplane stress analysis required by the Department of Commerce. To show the reader just how the calculations are made in actual practice, Professor Klemin takes an airplane of average characteristics and goes through the complete stress analysis, giving full examples of all the computations required. A preliminary review explains the principles of applied mechanics involved. In addition, in concise, easily usable form, data on materials of aircraft construction to which the calculator must frequently refer, are assembled for convenient reference. Tables giving the stress data constantly needed by engineers on steel, wood, tubing, hard wire, steel cable, tie-rods, rivets, bolts, wheels, tail-loads, etc., are included.

## Fluid Dynamics for Aircraft Designers

by **Max M. Munk**, Consulting Aeronautical Engineer, formerly in charge of Aerodynamic Research for the National Advisory Committee for Aeronautics. 44 illustrations, \$8.00.

THROUGHOUT this book for students of aeronautical engineering and designers it has been Dr. Munk's purpose to give the reader a clearer understanding of available knowledge relating to air motion in its application to flight phenomena. It systematizes, interprets, and places in convenient form much valuable information resulting from the author's many experiments. Many mathematical formulas are presented in greatly simplified form. Included among other topics are: the classical principles of hydrodynamics; the potential flow of the straight line; theory of the wing section; theory of the complete wing; propeller theory; air friction; measured air forces; correction of wind tunnel observations; etc., etc.

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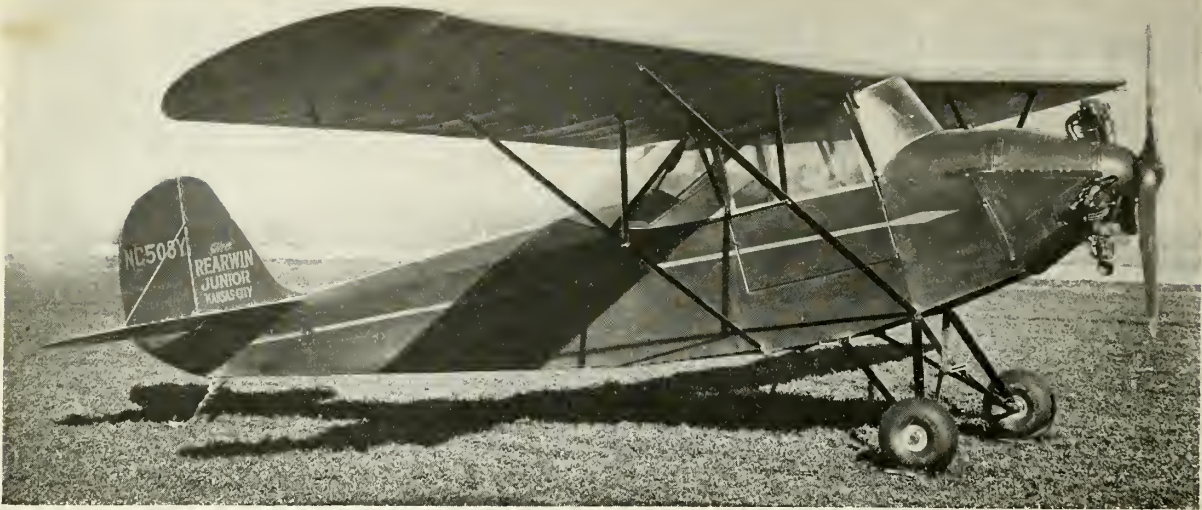
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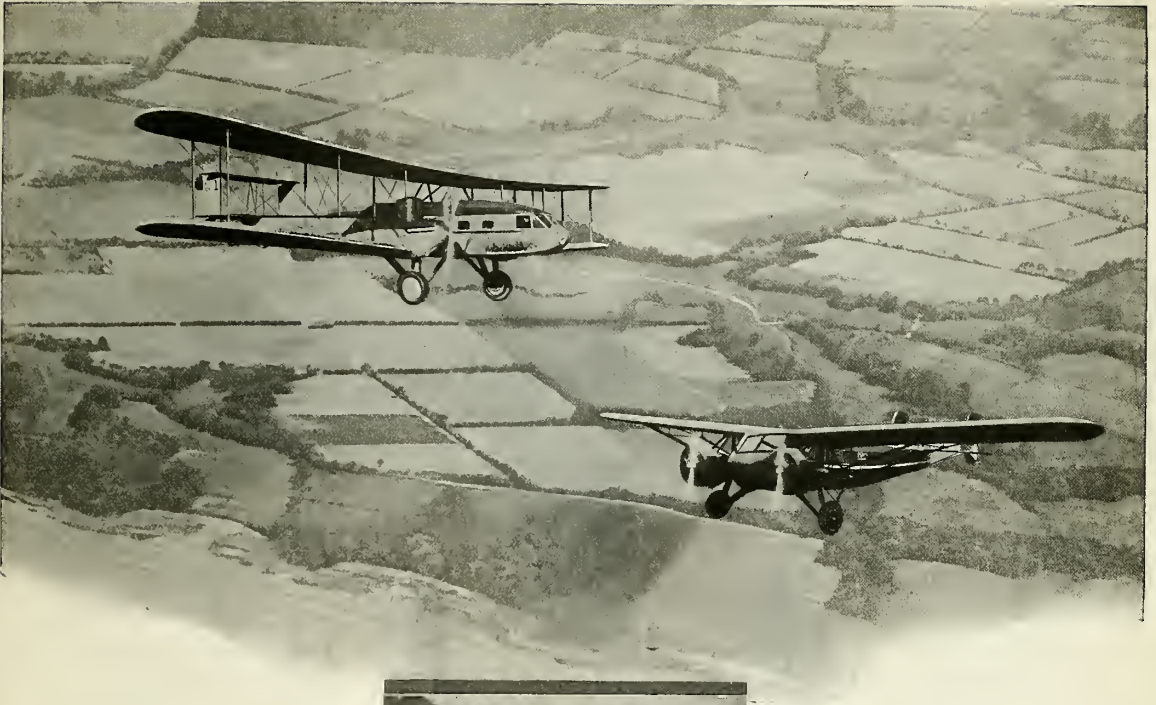
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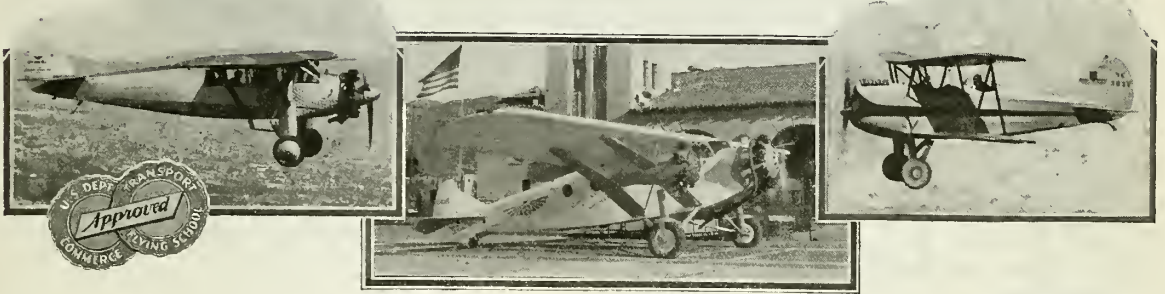
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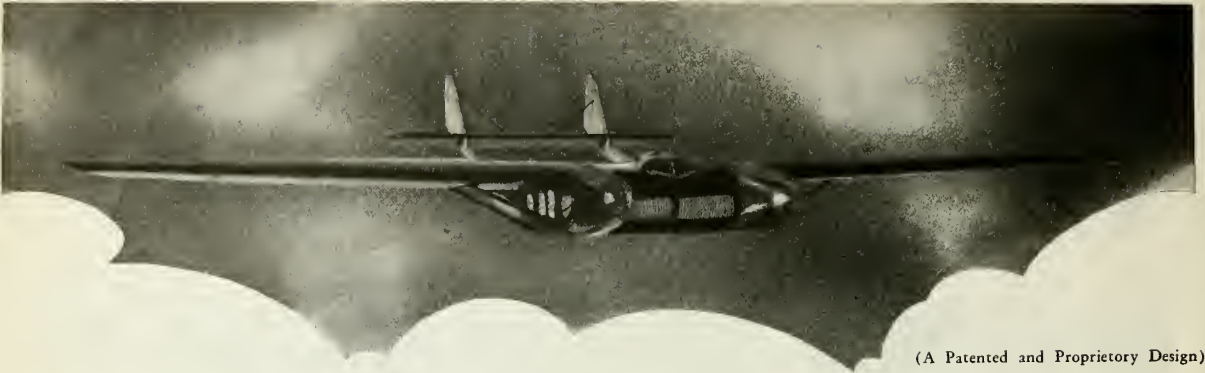
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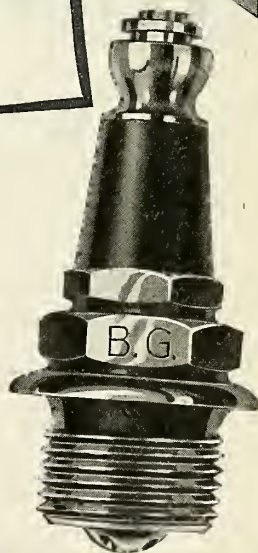


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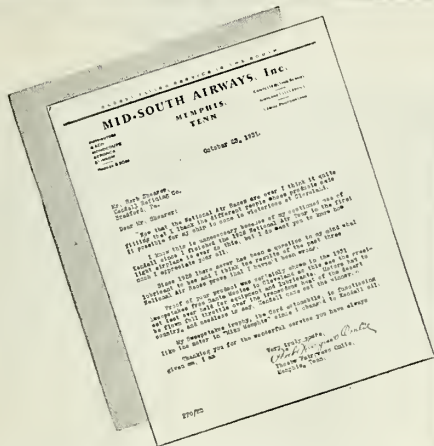
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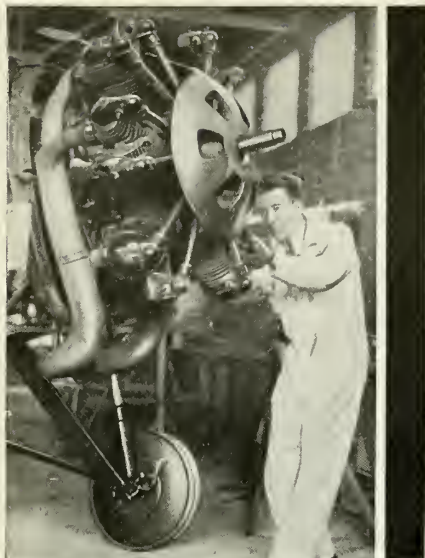
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## C O N T E N T S

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Powered with a 215 Horsepower Lycoming Engine*

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*News of Hawaii photo*

His glider carried to an altitude of 3,000 feet on rising currents near Honolulu, Lieut. Cocke stayed aloft twenty-one hours to a new record last December

# AN ADEQUATE AIR FORCE NEEDED

Major General James E. Fechet, U. S. Army, (Ret.)

ONE of the most difficult and perplexing problems our delegates to the disarmament conference have to face is a determination of our air strength as compared to that of European nations. Are we, as a nation, vitally concerned in the problem at all? If so, then what is an air force? What is its function in national defense? What is its relation to land and naval armaments? And lastly, and most important under present conditions, what is the smallest force which will meet our defense problem?

If we are to safeguard our tremendous wealth and maintain our position as a world power we cannot ignore the war-making forces of other nations, even if those forces exist today for purposes which do not directly concern us. We were drawn into war on European soil once against our will and it is more than possible that we may be again, when, no one can predict, and under circumstances much less favorable to us. Our greatest danger is that a desperate European power or coalition may turn those forces against us on our own soil.

We are potentially the most powerful military nation on earth but potential-strength is not actual strength. We need time for war mobilization, and time is just what an enemy cannot afford to give us. If we are attacked at all it will be suddenly and viciously, in the hope of winning the war before we can mobilize our strength. Therefore, the armed forces maintained in a state of readiness by possible enemies is of vital concern to us.

Our military policy, determined a generation ago by the National Defense Act, was based on the assumption that a small regular army backed up by a National Guard could enable us to repel an enemy invading our vital areas by mobilizing troops in such areas faster than the invader could transport troops overseas. We relied for protection to a great extent on the ocean and it was the function of our navy, in addition to protecting our sea lanes, to cut down the rate of invasion to such an extent that it could be repelled by our organized forces. We could then mobilize our resources for such offensive action as might be necessary to end the war. It has never been our intention to maintain in peace either an army or a navy for offensive action. If air forces have not changed our situation, our assumption is still sound; if our situation has changed, then there is no doubt that our policy must be revised.

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THIS is the second of a series of articles on national defense by General James E. Fechet, our National Defense Editor. History shows that previous to all our wars we were entirely unprepared. More through circumstance and luck we prepared and prosecuted the wars after their declaration, and as soon as the war was won we began immediately to disarm ourselves. This potentially disastrous disarming, now again rapidly continuing "in order to save money," not only is certain to ruin the efficiency of the Army and Navy but also to wash out many of the important peacetime industries which are most essential to our national defense. General Fechet's articles will show the enormous waste of time and money caused by the military policy of the United States from the beginning of our history. General Fechet will outline a plan to correct this foolish system which is not only wasteful but dangerous.

Frank A. Tichenor,  
Publisher.

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While aviation was used extensively in the World War the air force is really a post war development. The unsound use of aviation by all belligerents in the war is directly attributable to the natural but erroneous belief that in the airplane armies had found a new and powerful weapon, and we turned to the history of the development of new weapons to guide us in its use. We applied to it the old laws and proverbs having to do with new weapons.

The airplane is not a weapon at all. It is a means of transportation utilizing an element new to mankind. An air force is composed of airplanes transporting destructive materials such as high explosive and incendiary bombs, gas and machine guns direct to its objective. It derives its powers and limitations from the medium in which it operates—the air. These powers and limitations naturally differ so greatly from those of surface forces that it cannot be expected to perform their functions.

It has a duty in war all its own, new to warfare, and is an addition to the war-making forces comparable to the development of navies. It is a force in its own right.

It may operate independently of an army or navy directly against the war-making resources of an enemy nation. It may operate as a powerful assistant to the army and, within its radius of action, it is the controlling factor in sea power. Its limitations force it to confine its missions to those of destruction but few man-made structures can withstand the shock of a ton of explosive in a single bomb. The surface obstacles which limit the movement of surface forces are no barrier to it and as long as its flying fields are within operating distance of its objective, neither armies nor navies can protect the objective from destruction.

Armies are enabled to take the defensive against superior armies by utilizing terrain features and natural obstacles, and by entrenching, but there are no obstacles in the air nor can an air force dig in like an army. *The only way it can defend its own area is to destroy the attacking air force either in the air or on the ground and to do this it must be superior to the attacker.* This is a direct violation of precedent in defense measures and comes as a shock to military students who are accustomed only to defensive measures taken by armies.

Since an air force must be superior to the attacker at all points, detachments from it for (Continued on page 90)

# AIR—HOT AND OTHERWISE

## Moffett Knows

## Federal Airways

### Frank A. Tichenor

**I**N the opinion of Rear Admiral Moffett, the proposed bill now before Congress should be altered so that by 1933 two flying-deck cruisers will have been built and so that two will be built in each of the years 1934, 1935 and 1936, enabling all to be built, or at least laid down, before December 31, 1936, when the treaty expires.

*He regards this as essential to national defense.*

No fundamental changes would be required in present plans. It merely would be necessary to move up one year the cruisers authorized in each of the years 1934 to 1936.

He especially urges that two flying-deck cruisers should be built as soon as possible, so that this type may be tested as to its value, two being required for such a test, in order that one may be on each side in any war problem.

The Admiral, Chief of the Bureau of Aeronautics, talking on House of Representatives Bill 6661 before the Naval Affairs Committee, told its members a few facts that everyone in the aircraft industry should study and impress upon his friends and his friends' friends, inducing as many as possible to relay the Admiral's accurate point of view to their Representatives and Senators, impressing in no uncertain manner on these representatives the importance of immediate favorable action.

**WE MUST HAVE LANDING FIELDS AT SEA! THAT IS WHAT CARRIERS AMOUNT TO.**

How do we stand? Let the Admiral tell us:

Fourteen to eighteen vessels of the sort are needed if we are to have a balanced navy. Under our international agreements we are permitted, in all, fourteen vessels that can be fitted with flying decks, including flying-deck cruisers.

Of course, the average citizen, who depends upon our defensive forces, assumes that under the mandate of Congress everything reasonable in this line has been or will be done, that can be done. Let's see how Admiral Moffett figures it out.

Needing from fourteen to eighteen, and being permitted fourteen, we actually have three vessels fitted with flying decks, as compared with twenty-eight modern cruisers built, building or authorized.

Pretty serious shortage! It is, in fact, a shortage which cannot be overcome during the life of the treaty. Starting with 3/14, or 21 per cent of our total allowance, the placing of landing decks on 25 per cent or on 80,000 tons of our allowed cruiser tonnage will partly remedy our carrier inferiority—an inferiority which might cost us dearly.

Thus we can build eight flying-deck cruisers of ten thousand tons each to carry about nine 6-inch guns and 24 airplanes, for under the treaty, none of this tonnage must be used for 8-inch cruisers. A 10,000-ton 6-inch cruiser will mount 12 guns and carry four airplanes; therefore, by building eight flying-deck cruisers instead of eight ordinary 6-inch cruisers, we lose 24 6-inch guns and gain 160 airplanes in the fleet, a total greater than all that the *Lexington* and *Saratoga* can carry, and we get eight mobile landing fields.

The full utility of cruisers is not generally understood. They possess a usefulness other than that attributed to them. Beside the fighting usefulness popularly attributed to them, they should be credited with ideal ability for service as escort for convoys, long range search for raiders, trade protectors, including service in the capture or destruction of enemies threatening it, patrol of blockade, raiding, long range scouting, fleet tactical distant screening, close screening and support and denial of destroyer attack.

Actual fighting, of course, may result from any of these cruiser activities, but it probably will accompany only the last two. For ALL purposes the possession of flying decks and planes will greatly increase these vessels' radii of usefulness.

Flying decks make such ships far superior to ordinary cruisers, adding under almost all weather conditions a fighting ability which cruisers unequipped with flying-decks cannot possess.

Not only are such ships important, as compared with other cruiser types, as cruisers per se, but they have an additional and vital importance due to the fact that by furnishing landing decks they increase the efficiency of the air force of all the other vessels of the fleet, in effect making it larger.

Admiral Moffett, while granting that the value of flying-deck cruisers (as far as mere operation of number of airplanes goes) is less than that of carriers, maintains that their addition of landing decks widely dispersed throughout the fleet's operating areas adds greatly to the efficiency and safety of all aircraft carried by other fleet units.

The addition of flying-deck cruisers to the fleet will enable carrier-based aircraft to take its proper place with the main body of capital ships, the group to which carriers rightly belong, while assuring the fleet of aircraft for the all-important duties connected with escort, search, patrol, blockade, scouting and raiding, all purposes for which the flying-deck cruiser is admirably fitted.

The United States Navy, in Admiral Moffett's opinion, lost valuable years because carriers were regarded as in some degree experimental, a circumstance which prevented the building of others until the *Lexington* and *Saratoga* could be tried out. It is intensely important, he now thinks, that a similar course shall not be followed regarding flying-deck cruisers.

In a sense every type of ship is an experiment until it has been tried out in actual war, but all studies made at the War College endorse, so far as is possible in peace time, the great value of flying-deck cruisers, not only as such, but by comparison with cruisers of other types. The Admiral does not consider such vessels experiments except to a very limited degree.

In a sense the *Lexington* and *Saratoga* are flying-deck cruisers because each has a flying deck, because they carry eight-inch guns and because they carry many anti-aircraft

(Continued on page 86)



# AVIATION EXPORTS DURING 1931

**Leighton Rogers**

*Chief, Aeronautics Trade Division,  
United States Department of Commerce*

**A**N order was recently placed by the Swiss Air Traffic Company, Limited, of Zurich, for two American transport planes having a top speed of over 200 miles an hour and a normal cruising speed of over 180. Italy ordered a plane and engine of the type flown by an American pilot on inter-city speed record flights in the United States and Europe for over 71,000 hours without major overhaul. The Turkish government signed a contract to be supplied with American aircraft. Argentina, although it ordered planes from Europe, as well as the United States, during the year, has contracted for a large quantity of American engines. These are a few examples of the widespread and worthwhile export business accomplished by American aeronautics manufacturers during the year 1931.

Export shipments of aeronautics products, including complete aircraft, engines, parts and accessories, were valued at approximately \$4,800,000 in 1931, which exceeds the figure for 1928, up to that time the peak year for all time, by \$1,150,000. This is a decidedly favorable factor in the aviation business of the year just past when domestic sales declined so materially. Contrary to general opinion, not all the sales, nor by any means the majority, were of military types, although foreign governments purchased, in addition to strictly military equipment, a considerable number of planes for airline and other non-military uses.

There was a tendency during the year for manufacturers to negotiate sales through factory representatives and local representatives in the field without the aid of export commission agents. There was a trend in 1931 toward the granting of rights for the foreign manufacture of our engines and planes. Some of these have worked out suc-



A Stinson plane used along the Peruvian coast

cessfully. Others have not and one such arrangement effected several years ago was abrogated in 1931. Another tendency of importance which became almost an axiom of the aviation export trade during the year was for civil aircraft which were shipped abroad to be accompanied by an airworthiness certificate for export from the Aeronautics Branch. Not only shipments to countries requiring United States' certification of commercial aircraft were accompanied by these documents but private purchasers almost invariably insisted upon them, for they realized that the certificates are presupposed, by the three stages of Aeronautics Branch inspection—stress analysis, factory inspection, and flight test—to insure that the aircraft are up to requirements for license in the United States.

The strictly military types exported were invariably types upon which the United States military services have standardized and foreign governments during the year seemed to a greater extent than before to insist on American governmental use as a requirement of their own before placing orders. The fact that American military planes must be in use for 12 months in the services before export, unless specially permitted, may have reacted unfavorably on our industry's trade overseas, preventing it from making sales in competition with European producers the governments of which follow a more liberal policy with regard to foreign sales of new military aircraft. Very good reasons exist for this stringent American policy and in the long run our industry may profit. By means of this, it is known by the purchaser that the equipment imported has passed the most rigid of tests—not only intensive static and flight testing, but actual service operation under extreme conditions of temperature and altitude.

Considerable has been said and written during the year about the respective speeds of European and American military equipment to the detriment of the latter. This may have kept us from obtaining certain worthwhile business, but it is believed not to a very considerable extent. In the far-flung territories thousands of miles away from the aircraft factories, strength and comparative freedom from the necessity of frequent overhaul and extensive maintenance offsets the argument of greater speed which is stressed by our competitors. This sales factor of speed in military types is already swinging around to be in our favor.

During the latter part of the year the British had a price advantage of around 30 per cent due to the exchange differential. In spite of this in at least one market American civil planes were ordered, due to their being considered



A Curtiss Hawk over the Hague, Holland

more suitable than British types for the particular operation.

China was the leading market for complete aircraft. Including the five planes trans-shipped into China proper through Hongkong, 43 aircraft valued at \$687,000 went to that country. These aircraft ranged from light training planes to a two-engined amphibion, and a large tri-engined all-metal transport. Reports from China indicate that the American planes are well thought of. Their territory bears a startling similarity to the United States so far as flying conditions are concerned. One American engine of a type which was developed to its present state by extensive airline use in the United States is reported to have been used for 500 hours in China without an overhaul. This sort of treatment is not to be condoned, but the incident illustrates how the operating conditions in this country made our aviation products peculiarly suitable for operation under the unavoidably gruelling conditions often existent abroad.

Mexico was the second leading market for complete aircraft in 1931, purchasing, according to preliminary figures available, 28 planes valued at \$380,000. These included practically all types of American civil craft which are used on the scheduled airlines and for special services such as carrying pay rolls and bullion and for aerial surveys. It is significant that Mexico, with its high mountains, isolated sections and rough terrain, has, in these special services, employed single-engined equipment with payloads as great as 3,000 pounds. This indicates, as does the Chinese incident, the recognized reliability of American engines.

United Kingdom imported during the year seven complete American aircraft at a total valuation of a quarter of a million dollars, indicating that some of them, at least, were of comparatively high value. Shipping planes to England, with its highly specialized aviation industry, is like shipping the proverbial coals to Newcastle. The fact of the matter is that there are certain types of aircraft available here, which, due to differences in engineering thought and factory facilities, have not been developed in Europe. Although the Europeans stress the high speed of their military equipment, and sometimes justifiably, in comparison with ours, our commercial planes have a decided speed advantage over theirs. The types of plane exported to England were in this commercial-speed category, one model of which holds the world's speed-load record and another a single engined model of a type used on the American passenger airlines which must maintain cruising speeds of at least 150 miles an hour and as high as 170 in order to keep schedule.

Canada, the fourth leading market in point of valuation of aircraft purchases, took 16 aircraft during the year or approximately \$65,000 worth. For several years now American single-engined cabin monoplanes equipped with pontoons in summer and skis in winter have operated above the Arctic Circle in temperatures as low as 50° below zero. It is an anomaly that can be verified only by the fact that this same type of plane is one of the most successful in tropical operations. The 1931 export figure for complete aircraft to Canada does not show the true picture since an increasing number of American planes were assembled there, being exported from the United States as parts and engines.

Colombia's takings of American aircraft, during the year, consisted of training equipment and an amphibion.

Reports from there indicate that the planes are satisfactory in every way. In addition to being of exceptional strength they are said to have excellent performance for training purposes even at that high altitude.

The Philippine Islands entered the field as a formidable market during the year taking planes for use on an inter-island and taxi service. Guatemala purchased three civil open biplanes for military training and other governmental use.

The shipments of aircraft engines overseas during the year were the most favorable factor in our aeronautics export trade. American engines went mainly to countries where, because of subsidized aircraft factories, our complete airplanes are virtually excluded. Although 60 less American engines went abroad in 1931 than in the year preceding, the total valuation was but \$160,000 less. The 1931 figure was greater than the 1929 figure by \$100,000 and exceeded the 1928 engine export valuation by over \$700,000.

Soviet Russia was the leading market for our engines, taking 45 valued at \$322,000, as compared with the same quantity valued at \$185,000 during the preceding year, indicating that Russia is now buying very few from our surplus war stocks but is concentrating its interest in our recently produced power plants.

The Netherlands, which is making a United States pursuit plane under license, imported 32 engines in 1931; some of these engines are now being used on the Netherlands (K.L.M.) airline. Chile was among the leading engine markets, as it was for parts, due to the American branch factory in that country. Argentina purchased an appreciable quantity of American engines, as did Finland for use by the Finnish air force; Japan is using some American engines, imported during the year, on its tri-engined airlines, which attests to the widespread popularity of American power plants in competition with those of other nationalities.

Aeronautics parts and accessories shipped overseas from the United States during 1931, were valued at about a million and a half dollars, being \$300,000 greater in value than the shipments of these items during 1928, and \$700,000 and \$800,000, respectively, less than those of 1929 and 1930. Canada, Soviet Russia, China, Brazil and Japan were the leading aircraft parts markets in order of importance. Fifty-eight countries were purchasers, taking amounts ranging in value from \$13, in the case of Bulgaria, to almost \$300,000 in the case of Canada, the principal market. With this large number of countries in the market, it is apparent that there is hardly a section of the world which is not worthy of consideration as a potential outlet. Seventeen hundred and thirty dollars worth of our parts went to Italian Africa, ten times that amount to the Netherland East Indies, and even Bermuda—where airplanes are almost as rare as automobiles—imported \$130 worth.

It should be recalled that 1929 and 1930 were abnormal years in the shipment of aviation products, the former being one of optimistic expansion and the latter, one (during the last half at least) when there was a surplus of American civil aircraft, particularly in the light sport and training types; some of these were naturally sold at ridiculously low prices. The year just past was much nearer normal in respect to aviation exports and the growth of this worthwhile business should be a slow but steady one from now on.

# WHY LEAVE EARLY?

*by Caldwell*

**H**AVING grown somewhat enfeebled through this trying period of Prosperity (which I believe was what the boys voted for last time) I have naturally devoted some thought to the Next World. What is it like Up There? Or Down There, as the case may be? And are any Democrats to be discovered lurking in those halls of grace, or is the place, like Washington, reserved chiefly for deserving Republicans?

These and other important questions touching on the hereafter have occupied me of late. But what chiefly concerns me is this: Just what shall I be like when I get there myself? I mean, shall I spend eternity in the same mental and physical condition that I enjoyed immediately preceding my decease? Or do I have any choice in the matter?

Suppose, for example, that in my advancing decrepitude I fail to leap nimbly from the path of the onrushing truck, and wake up in eternity minus a leg. Must I then peg it along forever, or will my vanished leg be restored to me? If so, do I carry it there under my arm, or does the next arrival fetch it C.O.D.? And must I endure my corns forever, or will they be barred as unworthy to enter? Further, shall I perforce amble through the ages as the poor, puffing, creeping, toothless bloke I notice that I am gradually becoming, or may I pick out any earlier period of my life—say at twenty-five—and skip through the eons as a dashing young flying officer?

These, I submit, are sincere and weighty questions. One of our local saints to whom I brought the problem replied somewhat vaguely that "we would all be perfect Up There." But that answer does not satisfy me. Not by a long shot. If fellows like Pop Cleveland, Jack Berry, Ray Brown, Jerry McClelland, Dave Behncke, and myself suddenly and disconcertingly become perfect, none of us will recognize the others. It is not merely our few unconsidered virtues, but also our vices and imperfections that make us what we are. Remove them, and we become unrecognizable, as undistinguished as so many eggs.

Well, in my case, I am not sure of my eventual destination. Besides, from the Biblical descriptions of both places I have concluded that I prefer California or Florida, or even Illinois, to either. In short, friends like myself in doubt, tough and unsatisfying though I find this present existence, brief though it may be compared to eternity, and little as I like it at times, yet it remains the only state of which I know anything. Therefore I purpose to hang on here so long as life is even barely endurable. I am going to be with you, whether you like it or not, until such time as I am removed by due process of Nature, gang warfare, or some sacred struggle between nations.

This stubborn tenacity of mine is not, I notice by the

newspapers, shared by all who tarry for a space in this vale of tears and defaulted foreign government bonds. According to reliable reports, many pilots practically insist upon departing from this globe long years before Nature would indicate that there was any real necessity for their leaving us. Only the other day, for example, a pilot whom I knew persisted in his efforts to take his ship apart, and finally dropped down with the fragments.

This craft that my friend left us in was a small commercial amphibion, built for the express purpose of getting off land or water and going places through the air. So far as I know, it was correctly designed to accomplish that modest and useful purpose. And no other. Yet my poor friend, according to published reports, seemed to imagine that he was stunting in a Boeing pursuit, a ship built to perform all sorts of evolutions and to endure great strains without batting an eyelash. The result was that he and his little amphibion passed on to other realms.

Another noted pilot flew a ship that had been designed for a motor of around 500 horsepower, but that had been replaced by one to develop 800 horsepower. While flying at high speed the ship suddenly went out of control, rolled rapidly some three times, hit the ground, and burst into flames and the movie newsreels—much to the unsettlement of many prospective airline passengers, who sat in their seats wondering if airliners were prone to do likewise.

That spectacular and widely advertised disaster reminded me of a crash some years ago that likewise had been carefully and painstakingly prepared for long before the ship had left the ground for its final flight. The pilot removed the OX-5 for which his little cabin monoplane had been designed and replaced it with a J5. Hardly anyone was surprised when the ship, with himself and a load of mail aboard, fell apart in the air.

Of course, both of these ships had been "beefed up," as the saying goes, to carry the extra power. But about the only thing that had been adequately strengthened was the pilots' confidence. And you can't fly on confidence alone. You may put in a few extra wires, or increase the size of the wires, even make heavier fittings. But when all is done you still have a ship designed for so much power, with a little extra strength hung on it here and there. In effect, it is as though you had taken a five-ton truck, bolted a few extra pieces of metal onto it, and registered amaze-ment when it collapsed under a ten-ton load.

In a safety bulletin mailed last year to all pilots by the United States Aviation Underwriters, Inc., was published a letter from an old transport pilot who discussed the flying activities of four well-known stunt pilots, and ended with this: "They have flying ability; nobody doubts it. But I don't believe they have good sound judgment. And I'll make a prediction right here and now: if they keep on stunting, they're going to end up with a bunch of friends walking slow behind them. And it won't be because they died of old age, either." Well, to show you how well that old pilot could size up the situation, in less than a year two of the quartet had been killed. And in neither case was it the fault of the airplane.

You know, fifteen years ago an airplane was a fairly dangerous contraption; to-day it is reasonably safe if you give it a chance to be. The safety record of any properly managed airline is proof of that. Yet the newspaper accounts of crashes from stunting and bad weather flying bulk far larger than does a mere statement of safe passenger

*(Continued on page 89)*

# EDITORIALS

## Page Mr. Byrns!

**C**HAIRMAN BYRNS of the House Appropriations Committee seeks branches of the nation's money-tree which may be trimmed for the benefit of the nation's purse at this time. We offer one suggestion of the very sort which Chairman Byrns is seeking:

The elimination of the National Advisory Committee for Aeronautics, through the simple process of merging it with the Bureau of Standards.

This would save non-productive millions and give 100 per cent more in scientific investigations.

A study of the 17th Annual Report of the Advisory Committee plainly shows duplication of its research by the Bureau of Standards. The apparent reasons for this are, first, that the N.A.C.A. investigations were not exhaustive enough; second, that the personnel who started the work are not now available to finish it; third, that the Bureau of Standards is more competent to handle it. So why waste further time and money? Why not let the Bureau of Standards do it in the first place? Compare the experience and technical background of the active paid staff of the Bureau of Standards with that of the N.A.C.A. and understand why the Bureau is better fitted to handle the work.

The Advisory Committee includes the names of some very prominent men, appointed by the President or named in accordance with the Act of Congress establishing the Committee. The Committee has continued in existence because of exploitation of the power behind some of these names by the two active politicians in control of its detail work. They have been used as inferential propaganda to influence the Appropriations Committees of the Senate and House toward liberal funds so that these politicians may continue to hold their excellent berths—snug and warm, safe and smooth.

No fault is found with the approximately 200 employees at Langley Field. They wish for higher technical standards of work and in their effort to achieve them fail only because of lack of scientific leadership. The most vivid example of the misfortunes which have overtaken this important government activity to date is the fiasco of the giant wind tunnel. The air motion is so turbulent that the device scarcely can be called a wind tunnel. Many times have we heard it proclaimed "when this tunnel is in operation, guesswork will be eliminated from airplane design." Apparently it was not eliminated from the design of the wind tunnel. That probably is the reason why a passport system reminiscent of a French port in war time has been installed to keep out "undesirable" visitors, undesirable, in this instance, being a term applicable to anyone who might understand, and possibly take the trouble to reveal to Congress or the public, the facts of the colossal failure.

The power line which was to supply the 8,000 horsepower needed to operate this monstrosity was found to be capable of delivering just about one-half of that

amount, a detail of incompetent planning and engineering characteristic of the entire job.

There are two primary and personal reasons for the failure of the Committee to function as was intended by its organizers, viz., too much politics and not enough engineering ability.

On page five of the 17th Annual Report it is stated that "the secretary, Mr. John F. Victory, directs the administration work of the organization and exercises general supervision over the expenditures of funds and the employment of personnel," and on the same page it is stated that "general responsibility for the execution of the policies and the progress of the activities approved by the executive committee, is placed in the Director of Aeronautical Research, Mr. George Lewis."

Combine the N.A.C.A. with the Bureau of Standards. There is great need in this industry for the work. Under the direction of the Bureau of Standards it would be well done. The taxpayers' money would be saved. The aeronautic industry would be served.

## The Private Flier Market

**F**ROM all parts of the country we are receiving inquiries from those seeking information as to the private flier in the United States. Many seem to think that in this respect we lag behind some foreign countries.

Statistics show that slightly under 4,000 airplanes are owned by private American fliers. Not so bad for that part of an industry which is less than five years old. Four thousand is more than the entire number of planes owned by the Army and Navy.

Individually-owned and operated planes will increase in number when general business conditions change, provided the manufacturers of these craft have proper distribution facilities strategically located so as to be able to make the necessary demonstrations essential to turning prospects into owners of aircraft. Efforts also must be made to convince the prospect that when he buys a plane, the manufacturer is in a position to give him proper service at a fair price. A plane owned in California and parts and service securable only in New York is not a good sales argument and has turned many good prospects into watchful waiting ones. These details have been weak points with some of the manufacturers.

Aviation has never before shown so immediate a promise as is foreseen for it today by those close enough to its activities to know. The age of unintelligent and wildcat experiment is past. Financial bubbles blown into existence by many unsound groups of frenzied promoters, have to a large measure faded out of the air picture.

The pilot-executives, exalted to kingship for the moment of stock exploitation, have done their bit, and have gone back to their pilot seats, to perform their functions as the very good pilots that they were and are, while men trained in business in turn occupy their executive chairs, with the acumen and experience to bring aviation back to bases of progress that will insure its permanence and success.

The sound aviation developments are proceeding on a firmer footing than ever before.

# AVIATION IN CHINA

By

Walter Buchler



Part of the Great Wall of Old China

**A**IRPLANES have been seen in China as far back as 1909 but popular interest in aviation started only in 1924 and ever since has been maintained. The opportunities for

civil flying are limited to a few routes, these being Shanghai to Hankow and later on up to Chungking, with several intermediate stops; Nanking to Tienstin: and from Shanghai along the coast to Hongkong and Canton. Not all of these are yet in operation, but that is the plan of the China National Aviation Corporation (a Sino-American concern), taking both passengers and mail.

Perhaps the greatest interest shown in aviation has been by the Chinese authorities, who now realize the value of airplanes in warfare, even in the small sporadic outbreaks of fighting between the different military factions in China. Already five of the approximately twenty Provincial Governments in China have their own airplanes, and today both military officers and politicians are frequently adopting this method of locomotion to reach their destinations in the minimum time. For example, General Chiang Kai-shek, present President of the Republic and Commander of the Army, Navy and Air Force, has his own private plane though he does not fly alone.

As yet there is no real civil flying in China, all the pilots being military, holding the rank of Colonel. These officers are taken up for flights in order to test their capabilities as pilots. If their reactions are considered satisfactory, they are then trained without being first subject to the usual psychological and medical tests.

There are at present about ten air stations training some 80 students for service in the air force. The principal ones are located at Huanjao (near Shanghai), Nanking, Canton, Changsha Ichang, Chungking, Foochow and Mukden. Most of the instructors are Chinese, though occasionally foreign pilots are employed. So far there are no civil flying schools in China where Chinese might have the opportunity to become "airminded." Hangars in China are well constructed and flying fields have their workshops where men are trained as mechanics and riggers.

One of the principal drawbacks in China is that the Chinese have too many different types of machines, because they are inclined to buy only by reason of price. The Chinese have made three airplanes themselves but not with any great success, due to lack of experience in designing and mechanical knowledge. There is no doubt, however,

that China will one day manufacture airplanes with greater success. Given sufficient training and expert supervision, there is no reason why this should not be possible, but it

may take twenty years before China will have reached that stage. In the meantime, foreign designers would have to be brought in to teach Chinese the art of aviation.

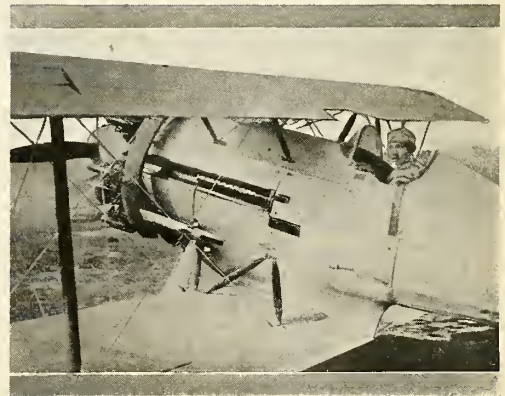
China has about thirty flying fields constructed, or in the course of construction, but little care is taken to keep them in proper condition. The Chinese do not consider machinery necessary for preparing them, and still use antiquated methods to keep the ground level.

There are three main military aviation centers in China at present, namely, Mukden, Nanking and Canton. Mukden has (or rather had before Japan took over that city) fifty machines, many of them De Havilland Moths, whilst Nanking uses mostly American machines. Canton has a varied collection of American, British and German machines. In central China several American bombing airplanes are in use, most of them being Douglas and Vought. There are a few seaplanes attached to the Navy. General Wen Lin Tschen's school is located at Amoy, and another school at Hungjao Aerodrome, Shanghai. The planes spend the time flying around but do not participate in war missions as most military activities thus far have occurred inland. The Naval Aircraft Factory is located at the Shanghai Naval Arsenal.

(Continued on page 98)



One of New China's business centers



A Chinese military pilot in a modern fighting plane

# PARASITE DRAG

The Twentieth of a Series of Articles  
on the Principles of Aerodynamics

By

Dr. MAX M. MUNK

**T**HE necessity for keeping down the drag of an aircraft is evident but the means of accomplishing this end are not at all obvious. What little is known about them has been learned from long experience. Knowledge of the subject is still so limited and sporadic that no scientific system or theory about it exists.

Air resistance is diminished at present by one universal method—streamlining. The shapes of all parts are so stretched and moulded as to present to the flowing air the easiest way to go around them with the least energy absorption. This same principle is applied to all aircraft parts, but in different degrees. It could well be carried on a little further without going to extremes and without interfering with other engineering and economic considerations. No fundamental and decisive progress in aviation can be expected from carrying the streamlining further, except a noticeable improvement in the performance and particularly in the speed. Just how much this method should be extended should be determined in each case by careful analysis.

Often parasite drag is still estimated as a whole from experience with similar types, or from a wind-tunnel test with a complete model. There is much to be gained from computing the parasite drag of an airplane by adding up the drag of all its parts; while this method does not give exact results, it is useful for the discussion of the improvement in performance which is expected from specific design changes.

The drag of the conventional parts of an airplane is given in aeronautical handbooks either directly in the form of their drag area or, more generally, in the form of their drag coefficient.

The drag area  $S$  is defined as the area having a drag coefficient of 1 and the same resistance as the part to which the coefficient applies. It is computed by dividing the drag by the dynamic pressure

$$S = \frac{D}{q} \quad \text{where } q = \frac{1}{2} \rho V^2.$$

Using pounds, square feet, and miles per hour, we may

express the drag as  $D = q S = \frac{1}{2} \rho V^2 S = .002558 S V^2$ .

The drag area  $S$  must not be confused with the equivalent flat plate area  $A$ , the latter corresponding to a different drag area, according to

$$D = .002558 S V^2 = .00328 \times A \times V^2$$

$$.00328$$

$$\text{or } S = \frac{.00328}{.002558} A = 1.28 A.$$

The drag coefficient is computed by dividing the drag area by the cross-section of the object, at a right angle to the motion. There is also often found an engineering modulus for the drag coefficient which results from it by dividing by 391. This is the drag in pounds per square foot of cross-section at the speed of one mile per hour; that is, it would be if the square law would hold exactly.

Different authors do not agree on the drags of the various airplane parts, not even on the drag of geometrical shapes. The measurement of the drag is indeed no easy matter, and no definite value of the drag of merely conventional parts exists. Even with objects of equal shape there is no definite drag. There exists a scale effect; the drag coefficient may be different if the scale or velocity differs, and this renders wind tunnel tests unreliable. There is an inclination effect, the parts having a different drag at different angles of attack. There is also the interference; the drag of two or more parts exposed in combination is different from the sum of these parts when exposed individually to the airflow.

There is, lastly, the surface-effect—the effect of the different degrees of stiffness or smoothness of surface. Drag measurements are not an exact science, and mere weighing will not lead to genuinely advancing our knowledge.

The designer needs a compilation of all drags known. A particularly complete and practical compilation is contained in W. S. Diehl's "Engineering Aerodynamics." For our present purpose of obtaining a good general picture of the subject, it would be only confusing to quote too many figures and to insert many diagrams. The order of magnitude of the drag coefficient of conventional parts is well established, and not very variable. Parts very far from

**T**HE decrease of drag should become one of the main objects of research and the aim of design, but thus far comparatively little has been accomplished. The betterment of airplane performance since the war has been chiefly due to the progress of engine design; nor has there been any stimulation from the research side for a new and intense attack on the problem of air resistance. It can be said that we knew but little about drag at the end of the war and that we do not know much more now, for nothing has been done in the way of systematic research along that line.

Theory fails utterly so far to contribute anything to our knowledge about how to diminish the parasite drag, because there is not enough experimental data to form the basis of such theory. What theory there is for the treatment of other aerodynamic problems may sound strictly logical but really it is not; it is only the essence of experience. Theoretical aerodynamics can be taught along purely logical and mathematical lines, but it could not be created in such a manner, nor will it be possible to advance the theory of the fluid resistance without painstaking experimental work.

Existing research facilities are unfortunately pressed into routine work and occupied with filling in the little depressions in roads that may lead to the wrong destination. We need some place of independent research where new roads may be laid out, not old ones repaired and paved, where the work can be devoted to aerodynamic progress along definite and fundamental lines, guided by scientific curiosity and the spirit of research.

being streamlined, such as flat surfaces facing the wing and round wires and cables, have a drag coefficient of the order of magnitude 1. This most natural value shows again the wisdom of defining the drag coefficient as we do. As a matter of fact, the drag coefficient of these objects is larger than 1; a good value for them is 1.2. A well-streamlined object, on the other hand, has a much smaller drag coefficient; its order of magnitude is 0.1, but it may go down to half of this, to 0.05 for the best strut sections, with a length to width ratio of 2.5 to 3. The drag coefficient of wing section cannot be directly compared with these values, because the wing (Continued on page 94)

# THE GIANT FLYING WING

David Earle Dunlap

**T**HERE are evidences of increasing interest in departures from conventional airplanes, inspired by the necessity for creating aeronautical vehicles of greater utility and economy than found within the limits of existing design. Among the more promising of these diversified types is the tailless airplane—the Dunne principle of a stable wing with modern refinements and improvements.

Apart from its safety features resultant from the inherent stability of its aerodynamic arrangement, and its lower initial cost and weight due to the decreased number of structural parts, the tailless airplane has a tremendous advantage from the reduction in its parasite resistance. As evidence of its efficiency, we cite the speed obtained in the German tailless designs of 78 miles per hour with but seven to nine horsepower, and 98 miles per hour with 28 horsepower; and these were small planes where an exposed body, landing gear and other parasites still exacted their toll of power. It was the latent commercial possibilities of this tailless airplane type which led to the projection of the giant flying wing shown in the accompanying sketch.

The ideal airplane would be one from which all accessories not actually necessary for flight would be eliminated. It would then be composed of a single wing carrying all the loads within itself, possessing a power plant, having the required controls contiguous with the wing surface, and a landing gear that could be folded up inside the wing. Reduction to this extent would effect economies in initial cost and maintenance, and increase the payload due to the reduction in the structural parts required. With the passengers and all contents within the wing the only power expended would be in the useful work of driving the wing, none being wasted in overcoming parasite drag.

Reducing the airplane to its simplest essentials becomes a question of seeking a wing form permitting the elimination of separate tail surfaces, of ascertaining what disadvantages this wing presents as compared with the standard type, and finally of seeking ways to eliminate such disadvantages. It is for these reasons we invoke the Dunne principle with modern improvements which have been demonstrated satisfactorily. Aerodynamically it is permissible to reduce the power required to that for the wing alone. We may say, with supporting data, that the power required would be less than half that needed for the normal machine.

Increasing knowledge of the accelerations and external loads and their distribution over the

structure during various flight maneuvers have enabled weight economies in certain classes of airplanes. Some types of planes are called upon to withstand greater shock or strain than others; their structures are therefore designed to provide for higher load factors than less maneuverable ships, a concept that has favorably assisted in combatting weight in large airplanes.

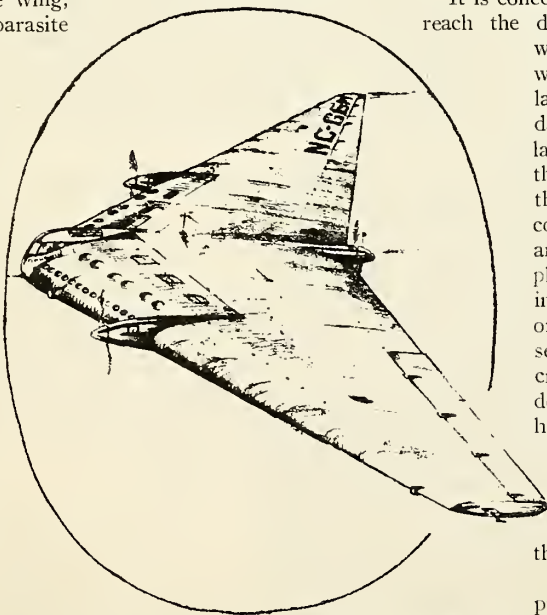
Another factor that has helped (and will help more in the future) is the development of new materials for airplane structures. To employ less weight in the structure for the requisite strength is of fundamental value only if durability and reliability are not sacrificed in consequence. We may expect the more extensive use of heat-treated materials to increase strength or further reduce weight, and in addition, the advent of new materials from time to time to economize in the same direction.

As the size of airplanes increases we have ways and means of reducing weight by using members of uniform strength. Considerations of production facility or economy in the current structure have left material in beams, ribs, struts, covering and the like that may be removed when the cost of doing so will have no adverse effect in the final strength.

Consider the wing structural weight. If the items comprising the total weight of the airplane may be installed at various points along the span of the wing, the stresses in the structure may be relieved at strategic points by the opposing effects of these weights and their reactions. A lighter wing is possible where the weight is distributed along the span instead of having the entire load concentrated in the usual manner.

It is conceded that this process must not reach the detrimental extreme where a wide distribution of the weights would create inertia forces large enough to seriously dampen the maneuverability, lateral control, or stability of the airplane. Improvement in this direction is possible as the controls are increased in power and efficiency, and in large airplanes maneuverability is not as important as in small pursuit or sport planes; in fact passenger comfort may be increased in the more sluggish design. In this connection we have an analogy between air travel of the future and water travel of today: the liner is more comfortable but less maneuverable than the small launch in the open sea. The Dunne principle shows promising results in the few experiments made to date.

(Continued on page 92)



Author's sketch of proposed flying wing in flight

# A SIMPLIFIED METHOD OF CLIMB AND CEILING CALCULATION

By

Dr. Michael Watter

AS it is often necessary to estimate performances expected of several proposed airplanes or to determine the effect of changes on existing designs, it is desirable, therefore, to use a method which combines with expediency a fair degree of practical accuracy.

The use of generalized charts based on horsepower, weight, span loadings and fineness of the designs has been proposed from time to time, but it was found that the calculations involved are somewhat lengthy and the results unsatisfactory. Even in more detailed performance estimates based on the average accepted engine-propeller data, it is almost impossible to predict accurately the rate of climb and intermediate climbs, although the high speed and ceiling can be obtained quite closely. This is possibly an indication that we may have to revise the engine-propeller data and obtain more information on the variation of parasite drag with change in angle of attack.

The present simplified method is based partly on the analyses of a number of test flights and partly on theory, but the aim was to sacrifice scientific accuracy for expediency and simplicity. Since any simplification necessarily leads to certain generalization it is possible that for some specific designs this method may lead to errors larger than considered permissible. In such cases it will be possible to revise the curves of THP variation with speed and altitude which would take into account the individuality of the design. It was found, however, that the data obtained on quite different designs always proved to be satisfactory within practical limits. The data which may be obtained by this method consists of climbing speed at sea level, rates of climb, time to altitude, service ceiling and absolute ceiling. The calculations do not require the plotting of curves of horsepower required and available.

The data required to apply the method consists of: maximum speed, stalling speed, maximum thrust horsepower, gross flying weight and equivalent monoplane aspect ratio. The method is based on calculated characteristics and charts given in figures 1 and 2 obtained by the use of actual flight test information.

The maximum speed may be obtained either from wind-tunnel test data or an estimate of parasite drag. The stalling speed is obtained using the monoplane value of  $C_L$ , maximum irrespective whether the design is a biplane or a monoplane. To obtain the thrust horsepower maximum it is necessary to know the brake horsepower of the engine,

revolutions per minute, propeller diameter, and maximum propeller efficiency. The average propeller characteristics can be found by the method given in Diehl's "Engineering Aerodynamics."

The following simplified assumptions are used in the present procedure:

Inasmuch as the variation of parasite resistance with the change in angle of attack is rather uncertain, it was thought best to separate the drag at maximum speed (considered as the minimum drag) into induced and profile and assume that the profile drag remains constant throughout the range of the calculations. While actually the profile drag does not remain constant,

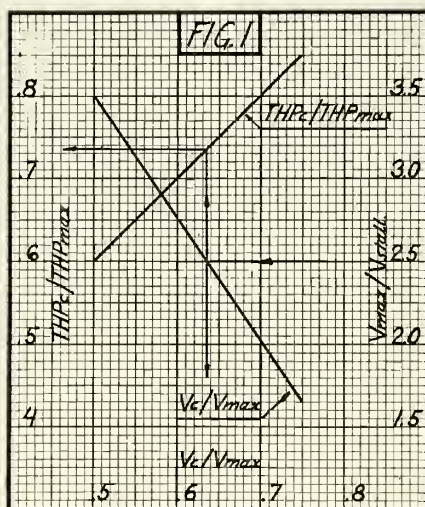
the charts being obtained in this way, the necessary corrections were automatically introduced. In order to obtain the speed corresponding to point of tangency of horsepower available and required curves at the ceiling, the relationship suggested by Diehl in his report on "A New Chart for Estimating the Absolute Ceiling of an Airplane" (NACA T.R. 368) is used here with slight modification. The fundamental assumption in calculating the ceiling consists of considering the true speed of climb as constant up to the ceiling. It was found that in most cases this leads to an error well within the limits of accuracy of this or any other standard method of performance calculations. The equivalent monoplane aspect ratio necessary for determination of the induced drag is obtained in accordance with standard methods of wing theory.

## Speed of Climb

The speed of climb is a function of both the maximum and minimum speeds and, therefore, is a function of the speed range. Bearing this in mind, the climbing speeds of flight tests were plotted as a fraction of maximum speed against the speed range, where the maximum speed was the one observed. The stalling speed, however, was calculated as explained above. Through the points obtained, a mean straight line was drawn whose equation can be written as

$$\frac{V_c}{V_{max}} = \frac{7.2 \frac{V_{max}}{V_{stall}} - 7.4}{7.4}$$

This relationship holds true within the limits of any speed range between 1.65 to 3.5, which is sufficiently broad to include any present design.





**Horsepower Required in Climb**

It was stated above that in order to simplify the calculations involved the total drag of the airplane is considered as consisting of induced and profile drags. The latter is assumed to be constant. Knowing the drag at maximum speed and having calculated the maximum speed, we can express the drag at any speed as follows. In the expressions below L and D designate lift and drag in pounds at one mile per hour on full size machine and f is merely a product (equal to .00256) of density and a constant of transformation.

$$DV^3 = 375 \text{ THP}$$

$$D = D_i + D_p \text{ but}$$

$$C_{L^2} S f \quad C_{L^2} S f$$

$$C_{Di} = \frac{\quad}{\pi a} \text{ or } D_i = \frac{\quad}{\pi a}$$

where a is the effective aspect ratio.

Expressing the drag at the angle of attack at maximum speed as  $D_m = D_{mi} + D_p$ , we can write the expression of drag at any other angle of attack as

$$D = D_m + D_i - D_{mi} \text{ or}$$

$$D = D_m + (C_{L^2} S f - C_{Lm^2} S f) \pi a \text{ but}$$

$$W = C_{L} S f V^2 \therefore C_{L^2} = W^2 / S^2 f^2 V^4 \text{ and}$$

$$D = D_m + \frac{W^2}{\pi a} \left( \frac{1}{V^4} - \frac{1}{V_m^4} \right) \dots \dots \dots 1$$

The horsepower required in climb is then simply obtained from the expression  $HP_{RC} = DV^3 / 375$ .

**Horsepower Available in Climb**

To determine the horsepower available corresponding to the speed of climb, the following procedure was followed. Actual flight test data for a number of airplanes was used, taking rate of climb and actual gross weight and from them obtaining the horsepower surplus at the speed of climb. To obtain then the thrust horsepower available, it is necessary to add the surplus power to the horsepower required at the climbing speed. Expressing this value as a fraction of thrust horsepower maximum it is possible to plot the ratio of  $THP_c / THP_{max}$  against  $V_c / V_m$ . It is sufficiently close to express the relationship of these two quantities within the range of the observed  $V_c / V_{max}$  ratios as a straight line whose equation is

$$\frac{THP_c}{THP_{max}} = .1 + \frac{V_c}{V_{max}}$$

This relationship is extremely simple and really does not need a plot. For completeness, however, it was incorporated in figure 1, the use of which is self-explanatory.

**Rate of Climb**

Knowing  $THP_c$  and  $HP_{rc}$  the rate of climb in feet per minute is obtained from the known expression

$$\frac{(THP_c - HP_{rc})}{W} \times 33000$$

**Absolute Ceiling**

Mention was made of the relation found by Diehl between the stalling speed and the speed at which the curve of horsepower becomes tangent to the curve of horsepower available at the ceiling. Inasmuch as the present analysis is based on a simplified variation of total drag of the airplane and is different from that used by Diehl, this speed will be found at times different from the 1.17

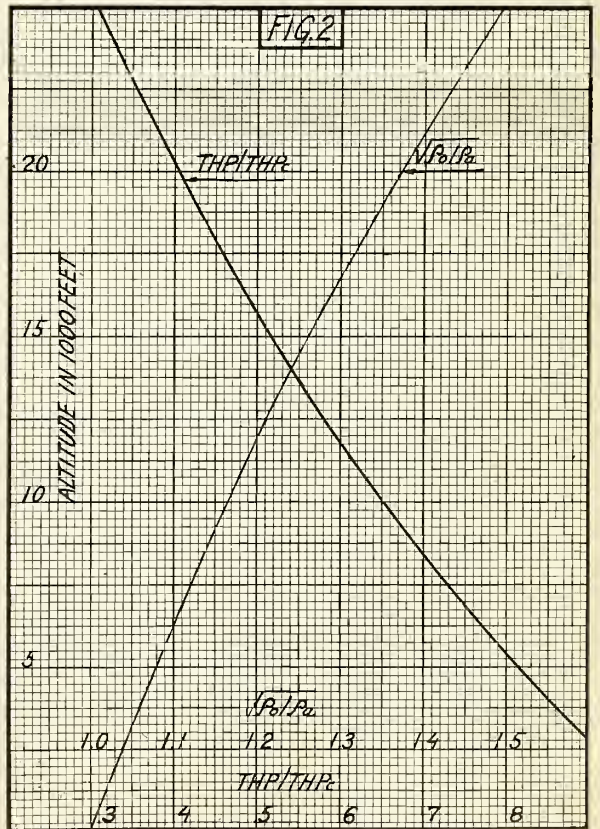
$V_s$  value given in the NACA T.R. 368 and in a large number of cases has been found to be close to 1.14  $V_s$ . This change is, however, quite unimportant since the horsepower required curve within that region is quite flat and it is often difficult to refer to a point of tangency of the horsepower curves, such a definition being more of a theoretical rather than practical value. Knowing this speed, it is necessary to determine the drag at the corresponding angle of attack from the equation 1 and the corresponding horsepower required.

The transformation of the horsepower curve at sea level to any other altitude may be made by multiplying the sea level speed and horsepower by the factor of  $\sqrt{\rho_0 / \rho_a}$  where the ratio under the square root sign is the inverse of the relative density. It is evident, then, that having assumed the speed of climb to remain constant and having chosen the sea level speed corresponding to the angle of attack at the ceiling, it is possible to determine the horsepower required at the ceiling from the expression.

$$HP_{RC} \text{ ceiling} = \frac{HR_{Ra} \times V_c}{1.14 V_s} \dots \dots \dots 2$$

The absolute ceiling is determined by obtaining the ratio of  $HP_{RC} \text{ ceiling} / THP_c$  and reading from figure 2 the altitude corresponding to the magnitude of that particular ratio. The curve given in figure 2 was plotted from results of a number of test flights by calculating the ratios obtained from the equation 2 and plotting corresponding absolute ceilings. The curve represents a good average, sufficiently accurate for the purpose of preliminary estimates.

The reader probably noticed the arbitrary assumption



that the ratio  $\sqrt{\rho_0/\rho_a}$  corresponds to the same altitude as the ratio  $HP_R$  ceiling/THP<sub>C</sub>. It will be found quite often that this is incorrect, indicating that either the speed of climb should not remain constant or the factor 1.14 should be changed. Because of the flatness of the curve of horsepower surplus against speed the influence of the variation in the true speed of climb seems to be unimportant and it is reasonable to assume that it is the factor 1.14 which should be modified for a given case to reconcile the condition at the ceiling. It was found, however, that the magnitude of the correction does not warrant its use and therefore can be disregarded.

**Service Ceiling, Time to Climb to Altitude, Climb in a Given Interval of Time**

Knowing the rate of climb at sea level and the absolute ceiling, and assuming a linear variation of rate of climb with altitude, it is possible to obtain the information desired by any grapho-analytical or analytical methods.

**Summary of the Method**

1. Calculate or estimate the minimum drag D<sub>m</sub>.
2. Estimate propeller efficiency.
3. Calculate THP<sub>max</sub> = BHP x η<sub>max</sub>.
4. Calculate  $V_{max} = \sqrt[3]{\frac{375 THP_{max}}{D_m}}$
5. Calculate  $V_s = \sqrt{\frac{W}{C_{L,max} S f}}$
7. Determine best speed of climb (figure 1)
- $V_c = 7.2 \frac{V_{max}}{V_s}$  where  $\left( 3.5 > \frac{V_{max}}{V_s} > 1.65 \right)$
8. Determine the horsepower required at V<sub>c</sub>  
 $D_c = D_m + \frac{W^2}{\pi a S f} \left( \frac{1}{V_c^4} - \frac{1}{V_m^4} \right)$  and  $HP_{rc} = D_c V_c^3 / 375$
9. Determine the horsepower available at the speed of climb (figure 1)  
 $\frac{THP_c}{THP_{max}} = .1 + \frac{V_c}{V_{max}}$
10. Calculate rate of climb at sea level from (THP<sub>c</sub> - HP<sub>rc</sub>) 33000  
 $\frac{W}{\pi a S f} \left( \frac{1}{V_a^4} - \frac{1}{V_m^4} \right)$  and  $HP_{ra} = D_a V_a^3 / 375$
11. Find drag and horsepower at V<sub>a</sub> = 1.14 V<sub>s</sub>
12. Calculate the ratio of  $\frac{HP_a \times V_c}{V_a}$  to THP<sub>c</sub> and from figure 2, read the absolute ceiling.

**Example Showing Application of the Method**

Data:

Gross flying weight	4000 pounds
BHP at 2050 rpm	460 horsepower
Propeller diameter	9 feet
C <sub>L</sub> max airfoil	1.33
Wing area, S	320 square feet
Equivalent monoplane aspect ratio, a	4.6

In addition it is necessary to have a three-view scale drawing.

1. Estimated total minimum drag at 1 m.p.h. = .0511 pounds.
2. Assuming propeller design speed as 140 m.p.h.,  
 $\frac{88 V}{88 \times 140} = .668$ ; uncorrected η<sub>max</sub> = .82;  
 ND 2050 x 9  
 Propeller-body interference, .96; net propeller efficiency, .82 x .96 = .788, or about .79 (propeller data from Diehl's "Engineering Aerodynamics").

3. THP<sub>max</sub> = 460 x .79 = 364
4.  $V_{max} = \sqrt[3]{\frac{364 \times 375}{.0511}} = 138.7$ , or about 139 m.p.h.
5.  $V_s = \sqrt{\frac{1.33 \times 320 \times .00256}{4000}} = 60.6$  m.p.h.
6.  $V_{max}/V_s = 2.3$ .
7.  $V_c/V_{max} = .662 \therefore V_c = 92$  m.p.h.
8.  $D_c = .0511 + \frac{4000^2}{\pi \times 4.6 \times 320 \times .00256} \left( \frac{1}{92^4} - \frac{1}{139^4} \right)$   
 $= .0511 + .015 = .0661$ ;  $HP_{rc} = \frac{.0661 \times 92^3}{375} = 137.5$
9.  $THP_c/THP_m = .762 \therefore THP_c = 364 \times .762 = 277$ .  
 $\frac{277 - 137.5}{33,000} = 1150$  ft./min.
10. Rate of climb at sea level,  $\frac{4000}{33,000} = 1150$  ft./min.
11.  $V_a = 1.14 \times 60.6 = 69.1$ , or about 69 m.p.h.
- $D_a = .0511 + \frac{4000^2}{11.81} \left( \frac{1}{69^4} - \frac{1}{139^4} \right) = .0511 + .0562$   
 $= .1073$ ;  $HP_a = \frac{.1073 \times 69^3}{375} = 94$ .
12.  $\frac{94 \times 92}{69 \times 277} = .452$ . From figure 2 we find the absolute ceiling 17,900 feet.

After having plotted the rate of climb line, the climb in ten minutes (8400 feet) and service ceiling (16,300 feet) were determined.

The performance figures obtained from the actual test flights in the case referred to above were: rate of climb, 1120 feet per minute; climb in 10 minutes, 8200 feet; and service ceiling, 16,300 feet.

**Conclusions**

It is believed that the example given above will facilitate the ready application of the method described in this article. It must be borne in mind that it is essential to obtain an accurate magnitude of the total minimum drag value D<sub>m</sub> of the airplane and it is recommended that use be made of either the method of summation of resistances or an estimation of the effect of changes from a known type of airplane.

The accuracy of any method of performance calculation or estimate hinges greatly on the magnitude of coefficients assigned, and in addition to their careful evaluation it is important not to overlook consistency. The method given above is based on characteristics and coefficients obtained in atmospheric tunnels at average V<sub>L</sub> values, and only the use of such data can be expected to give satisfactory results with the procedure outlined in this article.

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# PERSONALITIES

THE distinguished looking pilot with the trick moustache—an item so insignificant that it may not reproduce in the cut—is none other than Hal Forrest, creator of the aviation strip, "Tailspin Tommy," a newspaper feature in high favor with the youth of the land. While I am not a constant follower of Tommy—preferring to watch the equally amusing antics of our prominent people as reported in the daily papers—I understand that the younger lads take to this creation as eagerly as I, in my distant youth, used to follow the doings of Happy Hooligan and the Katzenjammers.

I know it has become the custom among the *literati* to sniff disdainfully at such things as comic strips, on the grounds that they depreciate the mentality of their perusers, but after all weren't most of us raised on such mental fare? Oh, I know that we're not mental giants, but is it reasonable to blame that on the comic strips? Was there any mentality worth mentioning, even before we became comic strip addicts? I doubt it. Speaking for myself, if my youthful mind had not been stirred by the comics, it would have remained unmoved, for I read nothing else. Perhaps this accounts for my deplorable condition to-day, but I think not. Born to be one of the *illiterati*, I have simply carried out my destiny, in spite of the comics.

Although I no longer derive much entertainment from this form of art, I believe that comic strips have a definitely useful part in developing the minds of children—to say nothing of the adults! They are simply a modern development of the Mother Goose rhymes, with pictures. From time immemorial—whenever that was—children have cried, "Tell us a story." And we have told them stories—which possibly accounts for the numbers of them who have become Republicans. Men like Hal Forrest tell them a better story, and illustrate it with appropriate drawings, a very clever thing to do—and get paid for it. I know many who have done drawings and never been paid for them. Nobody wanted them. I even know people who have written stories—and failed to sell them. So when anyone not only can tell a story, but also illustrate it, and—what is more startling—get paid for doing it, I take off my hat to him.

Hal Forrest started life July 22, 1895, in Philadelphia, the biggest small town in the world. Pained, hurt, and grieved at the lack of animation in that sad burg, Hal tried to enliven the scene by drawing pictures on the walls of his room. Even as a child he showed signs of becoming an artist. His



parents were in despair—they wanted him to become a plumber or a truckman—anything respectable. It was not to be. When he was sixteen, in the year 1911, his first comic strip appeared in the *Philadelphia Telegraph*. Whether or not that strip, "Percy the Boy Scout," hastened the demise of the *Telegraph*, Hal doesn't say. But I suspect it did. At seventeen he became—probably as a punishment for that comic strip—the youngest scoutmaster in the country, and headed the thirteenth troop established in America.

From 1911 to 1915 he attended the Art Institute of Chicago—this was before the only thing they drew in Chicago was beer. He was also a member of the art staff of the *Chicago Tribune* and of Troop A, First Illinois Cavalry. In 1914 he tried to enlist in the Royal Flying Corps, but was rejected



Hal Forrest, creator of "Tailspin Tommy"

because of Athlete's Foot. By the time the foot got less athletic he figured the Germans had piled up too much of a handicap of experience against him, so Hal went to North Dakota to develop his muscles and his bank roll in the harvest fields. Having worked for a very brief period in the harvest fields myself, I can declare that the only thing he developed was his muscle and probably a hankering for milder pursuits.

During 1915 to '17 Hal was a member of Headquarters Troop, Third New Jersey Infantry. He collaborated with Lee Pape, author of "Little Benn's Notebook," on a Sunday page of colored comics in the *Philadelphia Record*. The day war was declared, for no good reason, he enlisted and was assigned to the Aviation Section of the Signal Corps, San Antonio, Texas, and in time became Sergeant-Major of 144th Pursuit Squadron, Kelly Field. Just what he pursued, he does not state. I suppose he simply pursued his way through the war as peacefully as possible. Any ambition he might have cherished to engage in a death grapple with the late enemy was nipped in the bud, for George Creel got hold of him to do Liberty Loan Posters and War Cartoons for the Bureau of Public Information, and—if I am not greatly mistaken—the Bureau of Public Misinformation. When I think of the yarns we used to swallow whole—such as the German Corpse Factory and the crucified Sergeant! So far as crucifying a Sergeant went, most of the troops would have been in favor of it, anyhow. That goes for the troops on both sides.

Hal Forrest organized and commanded the First Preparatory Officers' Training Corps at Kelly Field in 1918, then was transferred as instructor to Fifth R. O. T. C., Camp MacArthur, Waco, Texas, where he was mustered out in December, 1918. During the following year he barnstormed with "Daredevil" Ed Larette and "Chubby" Watson, wingwalkers, through Louisiana, Texas, and Arkansas. At Shreveport, La., in 1919, he says that he fell out of the rear cockpit of an old Standard while taking photos of an American Legion baseball game, but that he landed back in the cockpit, due to the quick maneuvering of Pilot Toncray. If this story is true—and you have my permission to believe it or not, there is no compulsion in the matter—if it's true, then Toncray ranks as the world's quickest thinking and moving pilot. However, my own interpretation of the incident is that Hal merely got caught in some of the numerous wires with which the Standard was infested, or festooned, and that the

(Continued on following page)

# WHEN THE TEMPERATURE VARIES WIDELY . . .



Ewing Galloway



Courtesy Pan America Airways, Inc.

## What can the laboratory tell you about the oil you ought to use?

With winter and summer conditions only a few hours' flight apart, you need the safety afforded by the best there is in oil. The practical ideal is the lubricant which satisfies all of the requirements of your engine at normal operating temperatures, has a low pour point, and changes *least* in viscosity over the range of temperatures encountered. While flight tests are the final proving ground, the laboratory can guide your choice. What are their tests?

**VISCOSITY**—as determined in the United States, is the time in seconds required for 60 cc. of oil to flow through an orifice under standardized conditions.

Your engine *must* have proper lubrication at operating temperatures. Protection of bearings, cylinders, and pistons is assured only by an oil of the correct viscosity.

**VISCOSITY RATIO**—indicates the rate at which oil "thickens" with a given drop in temperature or, conversely, the rate at which it "thins out" with a temperature rise. To determine this, the laboratory measures

the viscosity at more than one temperature and compares the results.

Since aviation engines require efficient lubrication over a wide range of operating temperatures, *it is most desirable to have the characteristics of the oil change as little as possible under different conditions.*

**POUR POINT**—is the lowest temperature at which oil will flow when chilled under standardized conditions. Some oils congeal at a temperature as high as 45° F.; others may remain fluid at temperatures of Zero or below.

Unless your oil has proper viscosity and pour point characteristics you will experience difficulty in starting, improper lubrication, and excessive engine wear for the period immediately after starting.

Stanavo engineers have developed a lubricant which will safeguard your engine under the most severe conditions. It is the best combination of these qualities based on the extensive experience of the companies affiliated with Stanavo. It is uniform the world over.



# STANAVO

## AVIATION GASOLINE AND ENGINE OIL

STANAVO SPECIFICATION BOARD, Inc.  
*Organized and Maintained by*

Standard Oil Company of California  
225 Bush St., San Francisco

Standard Oil Company (Indiana)  
910 So. Michigan Ave., Chicago

Standard Oil Company of New Jersey  
26 Broadway, New York City

(Continued from preceding page)

Standard itself threw him back where he belonged. I have long been of the opinion that these old ships, taking us greenies aloft, looked after us, flew us around, and landed us again at their convenience. I know that in 1916 I went up in a Maurice Farman Shorthorn, and never flew it a foot, yet it brought me down again. I merely sat in it, with terror and concern stamped on my features, while it took me up and brought me down again safely. This particular plane actually served as my instructor, correcting my numerous errors, on the odd occasions when I attempted to move the controls at all. Usually, however, I merely sat in it, and went up and down as it willed. I still think this as good a system as any.

While at Kelly Field Hal had conceived the idea of an aviation comic strip, and drew cartoons for the camp newspaper, the Kelly Field *Eagle*; also he was art editor of the "Set-up," a camp newspaper at Waco, Texas. While a member of the 479th Pursuit Squadron, U. S. Air Corps Reserve, Clover Field, Santa Monica, Forrest organized his own syndicate and peddled "Artie the Ace," the first aviation comic strip. From this he developed his present feature, "Tailspin Tommy," which appears in over 200 newspapers in the United States in Sunday page and strip form. It also appears in Canada, Alaska, Porto Rico, Panama Canal Zone, and Sweden. In this strip Forrest strives to be authentic as to plane and motor details, and in the story he avoids using anything that could not be possible in aviation. In short, the strip is educative, and should be welcome in the sacred offices of the N. A. A., where it is badly needed.

In 1929 this aerial cartoonist made a four months' air tour of the United States, Canada, and Mexico, using twenty-two different air transport lines, and several military ships. He gave lectures from the stage, in classrooms, and over the radio on the advantages of commercial aviation. I suppose he carefully refrained from mentioning any of the disadvantages—most of us do! He holds a Department of Commerce Private License now, and flies his plane every day except Friday—because his wife is superstitious of Friday, despite the fact that Sunday, Monday, Tuesday, Wednesday, Thursday, and Saturday also have held their unlucky moments for airmen. However, she and his five-year-old daughter, "Bunny" Betty Lou fly with father on all other days of the week, so he doesn't mind the Friday layover.

And those, briefly, are the pertinent biographical facts about the creator of "Tailspin Tommy." He should be a very happy man. Through the use of his art and his creative imagination he is enabled to bring pleasure to hundreds of thousands of children. And what a wonderful privilege that is! You know, folks, we're all after something as we plug along through life—money, or success, or fame in some endeavor, or perhaps just the satisfaction of an ordinary

job well done. And at first the effort seems worth while, but later it doesn't seem quite so worthy—and finally we reach a stage where we wonder why we troubled ourselves so much, when all we have to show for our struggle is a little money in a bank, or a house or two, or children who don't bother much about us any more, or friends who've about forgotten us. We all, if we live long enough, arrive at that dreary stage. Then happy is the man who can look back along the road he has travelled and say, "Well, I haven't collected much baggage—but memories—and I don't seem to have got any place that amounts to anything, as I see it now. But anyhow, I'm mighty glad to recall that as I trudged along I was able to brighten things up a bit for the other travellers—made the time pass more pleasantly for all concerned." And that's what Hal Forrest does—brightens things up for the little travellers on the road. And that's a mighty fine thing to be able to do, if you ask me.



—Photo by Jiminy

"**C**ORSICA OR BUST!" shouted Gabrielle Gabardine (left) and Bettina Bombazine (right) as they leaped into the cockpit of their OX5-engined plane, "The Iron Horse," and took off in the general direction of Mussolini.

These charming little trixies, fresh—or fairly fresh—from Hollywood, are wearing the flying togs that the socially prominent will favor this season. Simplicity, you will observe, is the keynote of these creations by Splooch of Fifth Avenue. The tropical sun helmet worn by Miss Gabardine carries out the *motif* of the crash helmets used by Arctic submarine explorers when butting their heads against the walls of their cabins.

It was Miss Gabardine, you may recall, who so drastically frightened the horses on a Fifth Avenue bus in '93 by wearing bloomers while pedaling her bicycle past a stunned traffic cop.

**P**ILOT Harold B. Russell soloed in April, 1921, at San Diego, where he was born March 4, 1904. Not even the war jarred him loose from the soil of San Diego, for during that period he worked as a civilian mechanic at Rockwell Field. Of course he was only thirteen when America entered the war. I wish that I'd been only thirteen when America entered the war—the war would have been minus my company, and I'd probably have been much further ahead by now. My one consolation is that I'll be too old for the next one.

You know, I'm very much against war, at least in principle. It's a senseless, cruel activity, and I'd gladly see it abolished. However, until it is wiped out by all nations in concert, the only thing to do seems to be to get so well prepared to fight that everybody will be scared to pick a fight with you. But I'm really a pacifist at heart and therefore went one day to the meeting of a pacifist society. Well, sir, you never saw such a bunch in your life; half of them were regular old maids and the other half were male old maids with hardly any chins. They asked me to speak, as a pacifist, so I got up and said, "You know, folks, when I came here I thought I was a pacifist, but after looking this gathering over, I've come to the conclusion that what America needs right now is a real good war. Thank you." Then I walked out, which I guess was just as well, because some of them—especially the women—began to look as though they weren't as peaceful as they claimed to be.

Well, well, that has nothing to do with Hap Russell, who will be just a prime age for the next major conflict. It'll have to come soon, though, or he won't have any fun in it, because nobody but a professional soldier yearning for promotion enjoys a war after he has passed thirty.

In April, 1917, when he was just seventeen, Mr. Russell, who hadn't got around to a moustache at that time, leaped into the air solo, did all right, operated his own flying schools for two years, and in 1923 found himself pilot for the Ryan Company at San Diego. In 1924 and '25 he was pilot for Aero Corporation of California, and in '27 and '28 for Martin's Flying School, Santa Ana, Cal. He became Chief Pilot of Standard Air Lines in 1928 and continued in that capacity until May, 1930, when the Western Air Express took over that organization. He continued with them and later with American Airways as Pilot. He has some 5,000 hours and has flown on one route, from Los Angeles to El Paso, piling up a total mileage of 400,000 by July, 1931.



H. B. Russell

# Stinson Scores Again—



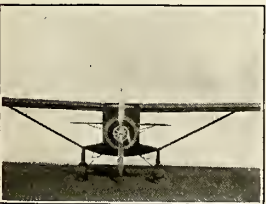
Increased comfort, roomier cabin, more headroom and wider, deeper seats set new interior standards



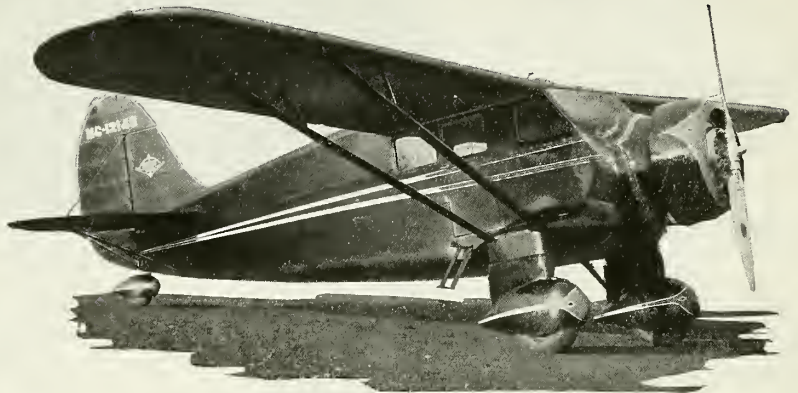
Vee windshield, improved vision, new indirectly lighted instrument panel... electric starter easily reached



Wider doors, easier entrance steps, streamlined landing gear... wind tunnel tested motor cowl



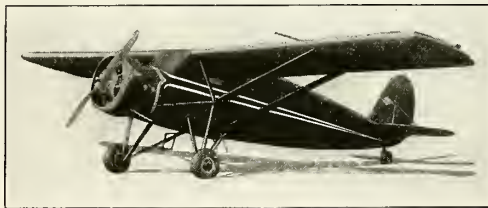
Clean, rugged, streamline fuselage cuts resistance and increases speed... retains Stinson operation economy



## Announcing . . . . the Stinson Model R

Greatly increased speed... high powered performance, without high cast... brilliant new beauty... completely streamlined... greater safety... more inherently stable than any previous Stinson... unmatched satisfying comfort... larger, roomier insulated cabin... wider, adjustable lazy back seats... new upholsteries, colors and refinements... wider doors... piano exterior finish... vee type windshield... shatter-proof glass... new indirectly lighted instrument panel... Pioneer instruments...

electric starter... quiet, reliable 215 horsepower Lycoming motor mounted on rubber... adjustable metal propeller... semi air wheels... roller bearings... self energizing brakes... hydraulic shock absorbers... cabin heaters... parking brakes... adjustable stabilizer... Only Stinson's success as world's largest cabin airplane builder, plus the ability and sixty-five million dollar resources of the Card Corporation, makes the Model R possible at its price of \$5595 f. a. f. Wayne, Mich. Equipment other than standard extra.



### THE POPULAR STINSON MODEL "S"

215 H. P. Lycoming powered four-passenger cabin monoplane has broken all records for cabin plane sales during the past two years. Public acceptance makes it possible to offer this plane, improved in quality for 1932, at the sensational new low price of

**\$4595**  
f. a. f. WAYNE, MICH.

Equipment other than standard, extra. Prices subject to change without notice.

STINSON AIRCRAFT CORPORATION, WAYNE, MICHIGAN  
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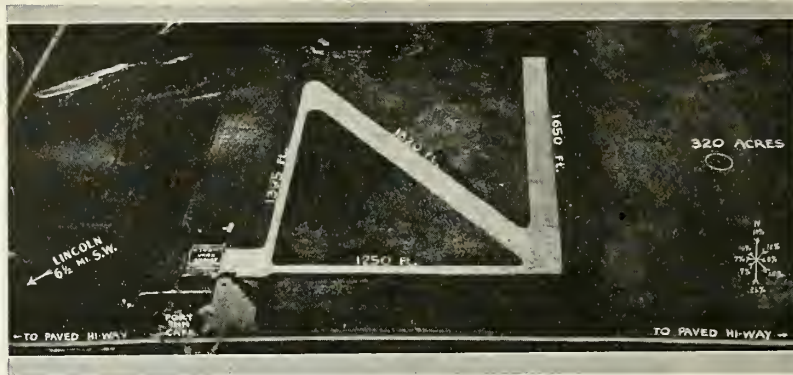


More Than Ever "The Aircraft Standard of the World"

# Construction of Runways, Union Airport

Roy M. Green

Manager, Western Laboratories



Air view of Union Airport, Lincoln, Nebraska, showing layout of runways

A PROBLEM which seems to be common to all airports in the United States is that of obtaining all-weather runways which will be cheap enough in first cost and maintenance so that their construction may be safely financed. The cost and economy of this construction is of such importance that many varieties of surfaces have resulted, depending upon local conditions and materials. The Union Airport at Lincoln, Nebraska, is a good illustration of the utilization of local materials and their adaptation to runway construction of a durable and economical type. Its particular interest lies in the character and thickness of its surface.

The area surfaced in 1931 was approximately 55,000 square yards, which embraced a continuation of the apron in front of the hangar, two taxiways, forty feet wide, having 1250- and 1395-foot lengths, respectively. Two runways, 120 feet wide, were also constructed, being 1820 and 1650 feet long, respectively.

Union Airport is located one mile north of Havelock, a suburb of Lincoln, and was constructed on land at one time considerably cut up by ponds and marshes. Before development was undertaken for aviation purposes these pockets had to be drained. Extensive grading operations, made in 1929, placed the property in such a condition that complete drainage of the area was assured after the runways were constructed.

Early in 1931 a contract was let to construct the runways and taxiways on the west portions of the airport property and for the installation of sufficient drains to provide complete protection to the runway construction and drain the area improved. The soil available for subgrade construction was the same as that encountered in the grading operations. In the old marshy places some organic matter was unfortunately left in its original position and covered up by the first grading operation. The top soil, exclusive of the marshes themselves, was a fine loam. This was underlaid by a deep layer of fine yellow clay. The prob-

lem then became one of compacting this type of soil to obtain a stable subgrade for a durable wearing surface.

The subgrade was first uniformly and carefully graded and compacted. Upon this subgrade was applied a layer of approximately one-half an inch of Platte River road gravel and upon this insulating layer a gravel asphaltic concrete wearing surface two inches thick of the hot-mix type. The composition of this surface was so controlled that, after rolling, the surface texture of the runways was granular in character, which was particularly desired for preventing skidding and slowing up landing planes. The thin layer of road gravel formed a parting between the asphaltic concrete wearing surface and the subgrade material which would be subject to considerable volume change in passing from a moist to a dry condition.

Runway and taxiway areas were graded to their approximate cross-section and thoroughly rolled. Fills were rolled in from 4-to-8-inch lifts. The subgrade area was brought to the approximate cross-section and elevation, carefully fine-graded to the exact cross-section, and again repeatedly rolled. After this cross-section was obtained, the required amount of road gravel was applied, being specified as fifty pounds per square yard, and was evenly spread upon the subgrade and the rolling again repeated. The grading was done during April and May when there were rains of considerable intensity which proved to be of great assistance in producing a thoroughly compact subgrade. After each rain the subgrade was rolled continuously until it became dry.

A few minor areas did not respond to this treatment as they were found to contain partially decomposed vegetable matter which had been covered up with old marshy spots in the original grading. These spots were excavated, the old marsh grass removed, and the holes refilled with clay subsoil and recompacted.

The two-inch gravel asphaltic concrete was laid hot upon the compacted gravel-

treated subgrade and raked and rolled with eight- and five-ton tandem rollers. In the laying of the hot mixture, the wide runways were divided into thirds and a long strip forty feet wide was laid at one time. The wearing surface was thoroughly rolled, until no further compression was possible, and lightly swept with limestone dust.

The contract price for this work was 80 cents per square yard, which included the preparation and treatment of the subgrade and the complete cost of laying the wearing surface. The success of this light form of construction was assured by the fact that a good subgrade was prepared and effective drainage was accomplished by the use of a system of perforated drain pipe which amply cared for all surface water from the runways and taxiways and the surrounding areas.

## McINTYRE AIRPORT

Tulsa, Oklahoma

McINTYRE AIRPORT, which comprises 160 acres, is situated eight miles southwest of Tulsa, Okla., and was formerly owned by the Garland Aircraft Corporation. It was acquired in November by the present owner, D. A. McIntyre. The field is square and level with an all-way turf permitting runways in all directions and, in addition to possessing natural drainage qualities, it is also tiled. The immediately surrounding country is level, permitting a clear approach to the airport.

The lighting apparatus includes boundary, obstruction, and flood lights, ceiling indicator, siren and revolving beacon. The buildings are grouped along the south side of the field adjacent to

(Continued on following page)





**S**INCE September 1930 The Ludington Lines' *every hour on the hour* New York, Philadelphia and Washington service has become the accepted mode of travel by business executives and men of affairs. In serving so successfully this distinguished patronage, the prestige and popularity of The Ludington Lines indicate an enviable mastery of air transportation. This growing popularity, expressed by a steadily increasing volume of traffic, has necessitated additional equipment » » » Guided by the knowledge and experience resulting from the record of 2,080,634 miles flown, and 87,520 passengers carried since its inception, and by the intimate under-



standing of those comforts and conveniences most appreciated by air travelers, as well as the necessity for greater speed and the rigid economy of maintenance required to facilitate profitable transport operation . . . The Ludington Airlines, Inc.—with the equipment of the world's markets available — chose THE FLEETSTER.

and  
**THE FLEETSTER**

CONSOLIDATED AIRCRAFT CORPORATION • BUFFALO • N • Y •

(Continued from preceding page)

Highway No. 64. In the southwest corner is the dormitory, a rectangular building about 40 by 100 feet, which contains 30 beds, lavatories, showers, and caretaker's quarters. The next south in the group of buildings is the administration building, approximately 75 by 100 feet, containing the general offices, lounge, classroom and coffee shop.

Separating these two buildings and the large hangar is a packed-gravel parking lot, 175 by 500 feet, leading to the main gates. At the opposite end of the parking area is the main hangar, 85 by 110 feet, of steel construction and conventional design. The storage section of the hangar accommodates about seventeen ships. Flanking the north side, are the garage, fabric and doping rooms and along the south side, the engine and airplane repair shop. Upstairs, immediately

above the repair shop is the photographic laboratory, containing equipment to handle all kinds of aerial photography.

Included in the servicing equipment of the airport are an oil reclaiming unit and a gasoline refueling tank truck, as well as a stock of popular engine replacement parts and various replacement propellers. The main hangar houses the several transport and training ships belonging to the airport, as well as some privately owned planes. Additional storage accommodations are available in fourteen individual steel hangars, all of which are rented by plane owners in the Tulsa area.

The McIntyre Airport offers cross-country transportation, student training, aerial photography and mapping, aircraft repair and parachute packing, and is distributor for the Waco, Stinson, Stearman, Northrup and Buhl airplanes.

having a total of 175, while Texas was second with 141. Pennsylvania, with 103, occupied third place. California, aside from having the largest total, also had the largest number of municipal airports, 59. Pennsylvania led in number of commercial airports with 67. Alaska had the largest number of auxiliary fields, 62.

The list compiled by the Aeronautics Branch shows that on January 1, 1932, there were 636 municipal, 673 commercial, 404 intermediate, 300 auxiliary, 54 Army, 13 Navy and 13 miscellaneous airports and landing fields. On January 1, 1931, there were 550 municipal, 564 commercial, 354 intermediate, 240 auxiliary, 53 Army, 14 Navy, and 7 miscellaneous airports and landing fields. Of the total number of airports and landing fields the largest increase has occurred in the number of commercial airports. There were 673 of these on January 1, 1932, while on that date a year before there were 564.

## CURRENT AIRPORT AND AIRWAY FACTS

### Landing Fields Increased in 1931

THERE were 311 more airports and landing fields in the United States on January 1, 1932, than there were on the corresponding date in 1931, according to a report made public by the Aeronautics Branch of the Department of Commerce. On January 1, 1931, there were

1,782 municipal, commercial, intermediate, auxiliary, Army, Navy and miscellaneous Government, private and state airports and landing fields, while on January 1, 1932, there were 2,093 such landing facilities.

California led all other states in the number of airports and landing fields,

### Business Travel Planning Bureau

THE success of the Business Travel Planning Bureau, established by American Airways, proves that business men are interested in air transportation and, when presented with the facts, recognize their need for the services which the air lines are in a position to give them. The service offered by the Bureau is an innovation in transportation selling. The prospective traveler simply furnishes a list of the cities he wishes to visit and an estimate of the approximate number of business hours he wishes to spend in each city. The planning service does the rest, making reservations and furnishing tickets, if desired, over all the lines it is necessary to use. There is but one transaction. The traveler is handed a personal schedule card which shows at a glance the time of arrivals and departures, fares, airport distances, and every other bit of information he requires, and he goes on his way relieved of any delay or annoyance.

Since the establishment of the Bureau on October 1, more than three thousand trips have been planned in the most convenient combinations, using not only American Airways, but any other reliable air system which facilitates the journey. The Bureau also is prepared to furnish a comparison of both the time and the cost between making the trip by air and by any other transportation method.

### American Airways Statistics

A RECENT report announced by F. G. Coburn, President of American Airways, gives the following statistics for his company during the past year:

Planes of American Airways flew a total of 7,568,968 miles in 1931, an increase of 100 per cent over 1930.

	Municipal	Commercial	Intermediate	Auxiliary	Army	Navy	Misc.*	Totals
Alabama	6	4	9	7	3	..	..	29
Alaska	5	..	..	62	..	..	..	69
Arizona	23	7	13	7	1	..	..	51
Arkansas	13	5	4	6	..	..	..	28
California	59	62	27	23	3	1	..	175
Colorado	17	8	5	7	1	..	..	38
Connecticut	6	10	1	2	..	..	..	39
Delaware	..	2	..	..	..	..	1	4
District of Columbia	..	1	..	..	1	1	..	3
Florida	28	15	4	11	..	2	..	60
Georgia	17	2	19	1	1	..	..	40
Idaho	21	1	10	12	..	1	2	46
Illinois	14	47	12	5	2	1	..	81
Indiana	8	19	14	1	1	..	..	45
Iowa	10	16	11	3	..	..	..	40
Kansas	23	20	6	5	2	..	..	56
Kentucky	5	8	7	..	..	..	..	20
Louisiana	10	6	2	4	..	..	..	22
Maine	2	9	..	5	..	..	1	17
Maryland	2	11	3	3	3	..	..	23
Massachusetts	4	27	2	6	..	1	1	41
Michigan	35	29	2	7	2	..	1	76
Minnesota	14	8	2	1	1	..	..	26
Mississippi	10	1	4	3	..	..	..	18
Missouri	6	10	11	3	..	..	..	30
Montana	15	4	9	6	..	..	..	34
Nebraska	11	5	13	..	1	..	..	30
Nevada	7	2	13	2	..	1	..	25
New Hampshire	7	4	..	6	..	..	..	17
New Jersey	5	18	1	2	1	1	..	28
New Mexico	9	5	10	8	1	..	..	33
New York	16	54	9	7	3	..	1	90
North Carolina	12	10	9	5	1	..	..	37
North Dakota	12	4	..	..	..	..	..	16
Ohio	13	40	18	8	4	..	1	84
Oklahoma	24	15	9	10	1	..	..	59
Oregon	17	6	19	5	..	..	..	47
Pennsylvania	6	67	18	7	3	1	1	103
Rhode Island	..	8	..	1	..	..	2	11
South Carolina	8	4	3	..	..	1	..	16
South Dakota	7	13	..	..	..	..	..	22
Tennessee	9	5	8	5	..	..	..	27
Texas	52	13	43	21	12	..	..	141
Utah	3	..	19	..	..	..	..	22
Vermont	3	7	..	1	1	..	1	13
Virginia	10	8	10	4	1	2	..	35
Washington	17	13	6	2	3	1	..	42
West Virginia	2	7	..	..	..	..	..	12
Wisconsin	22	29	7	8	..	..	..	66
Wyoming	11	2	12	3	..	..	..	28
TOTALS	636	673	404	300	54	13	13	2,093

\*Miscellaneous column includes Government, private and State airports.

(Continued on following page)



## GOODRICH ALL AROUND

CENTURY AIR LINES overlook no detail in its effort to provide the utmost in safe, dependable transportation.

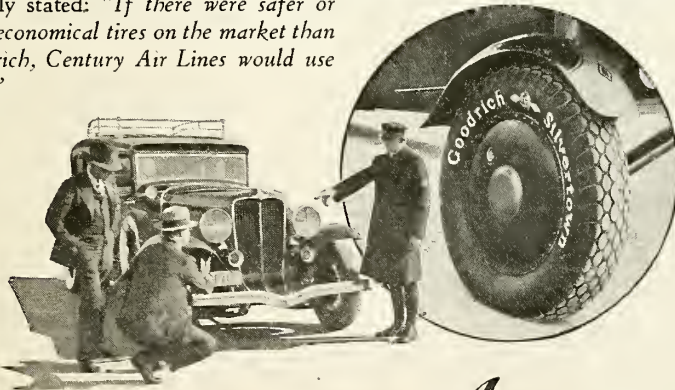
Century planes are equipped with Goodrich Silvertown airplane tires. Its motor cars are also Goodrich-equipped, and their drivers are pledged to the Goodrich Silvertown Safety League.

Speaking of Goodrich airplane tires, Mr. William F. Bliss, General Manager of Century, recently stated: "If there were safer or more economical tires on the market than Goodrich, Century Air Lines would use them."

Mr. Barney Graves, traffic manager of Century, also says: "We have used Goodrich Silvertown airplane tires since our first plane was put into service. We feel these tires have been a big factor in the excellent operating record which Century Air Lines have established. Your Silvertown Safety League impresses me as one of the greatest contributions ever offered to the cause of safe driving."

Goodrich sets the standard of safety both on land and in the air. A set of Goodrich Low Pressure airplane tires can be easily and quickly installed on your plane with or without brakes.

See your nearest Goodrich dealer, or write to the Aeronautical Division of The B. F. Goodrich Rubber Co., (Estab. 1870), Akron, Ohio, or Los Angeles, California.



One of the huge Goodrich airplane tires on a Century Plane. Left — official attaching Goodrich Safety League emblem to Goodrich-equipped Century Line motor car.

# Goodrich Airplane Tires

Another B. F. Goodrich Product



Over 40 rubber products for airplanes • Silvertown Tires • Tail Wheels  
Hose • Tubing • Engine Mounts • Crash Pads • Matting • Accessories,

(Continued from preceding page)

crease of 802,849 miles over 1930, or approximately twelve per cent. During the year 1,191 miles of new routes were added to the company's system, which now serves fifty-eight cities in twenty states with a total mileage of 8,625.

Comparative figures for 1930 and 1931 are shown in the following table:

	1930	1931
Revenue miles flown....	6,766,119	7,568,968
Passengers carried .....	60,074	51,647
Mail carried (lbs.).....	1,231,246	1,509,805
Express carried (lbs.)..	18,836	20,920

The decrease in passenger traffic was thought to be due to the discontinuance of the Cleveland-Chicago-Kansas City-Dallas route, which has been superseded by the more direct mail and passenger line from Cleveland to Dallas via Cincinnati, Louisville, Nashville, Memphis, Little Rock and Texarkana. Elsewhere on the company's lines passenger travel increased.

A number of passenger schedules were added in 1931 including three additional round trips between Boston and New York, making six daily; a daily round trip between New York and Cleveland with stops at Albany, Syracuse and Buffalo, and daily round trips connecting Chicago and Cincinnati, Chicago and New Orleans, Cleveland and Dallas, Cleveland and Louisville, Dallas and San Antonio, Dallas and Houston, and Dallas and Amarillo. Two extra round trips were added between Chicago and St. Louis.

#### Boston-Albany Airway

**D**IRECT air connection from Boston and Springfield to Albany, Syracuse, Rochester, Buffalo and the West is now assured by the announcement from Washington that the Inter-Departmental Commission on Civil Airways has approved the establishment of a lighted airway of 121 miles crossing the State of Massachusetts between Boston and Albany, with an intermediate stop at Springfield.

American Airways, which operates the New York-Boston and New York-Albany-Buffalo-Cleveland air-mail and passenger routes, has reported that as soon as the new airway is completed and contracts arranged, it will operate a regular scheduled service which will shorten communication between the New England cities and up-state New York.

Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, has announced that Government engineers will soon undertake a survey of the Boston-Albany route to determine the locations of beacon lights and intermediate landing fields. This project is said to complete the allocation of air-mail mileage in the United States for the current fiscal year ending June 30.

#### Ludington Fare Reductions

**A** DRASTIC reduction in flight fares, effective January 16 and varying from 5 to 25 per cent of former rates, has been announced by Gene Vidal, Executive Vice-President of the Ludington Lines, which operates airplanes every hour on the hour between Washington, D. C., Baltimore, Philadelphia and New York City. The reason advanced by Mr. Vidal for the reduction in fares was that the company was eager to increase its mid-winter traffic in preparation for its new recently announced spring schedules for which special fast planes already have been ordered. The new tariffs are to be in effect for the winter months only.

The new fast service to be inaugurated shortly will be flown with nine-passenger planes cruising at 160 miles per hour. The flight between New York and Washington will be made in eighty minutes with total elapsed time city-to-city of approximately two hours.

#### Report of Tulsa Municipal Airport

**T**HE annual report of Tulsa Municipal Airport, announced by the manager, C. W. Short, Jr., for the year ending December 31, 1931, gives the following statistics:

In regard to traffic, 84,510 persons were carried in and out of the airport in 27,412 planes during 1931. Since the airport opened on July 3, 1928, 282,510 persons have cleared the port in 88,112 planes without injury to any passenger. Including school operations, demonstration of aircraft, and other landings and take-offs, 291,710 persons cleared the port in over 90,000 planes since the beginning of operations. The largest month on record was June, 1930, when 11,009 persons arrived and departed. Airline scheduled flights have averaged 34 per day or 12,240 for 1931. Incoming mail amounted to approximately 25,000 pounds and outgoing mail 26,400 pounds.

Regarding income during 1931, the airport was self-sustaining and showed an operating profit. Of all the income, 43% was derived from the sale of gasoline and oil, 31% from operation charged, 20% from storage, and 6% from concessions. In this period, approximately 500,000 gallons of gasoline and 6,000 gallons of oil from the airport were consumed by all operating companies.

#### Eastern Air Transport Reports Progress

**D**URING 1931 fifteen cities were added to the Eastern Air Transport passenger system, 1,324 miles of new airway were joined to this company's routes, and mail and passenger volumes grew to new high records, it was announced in the annual summary of progress issued recently by the com-

pany. With the closing of the year the company was flying a total of 12,549 scheduled miles daily with passengers and airmail, its route being a total length of 2,876 miles.

The closing months of the year have shown an increase of approximately 300 per cent in passenger volume over the first few months, and the air-mail volume, which will total approximately 930,000 pounds for the year, will exceed that of the previous year by about 280,000 pounds.

During the year, Eastern Air Transport inaugurated eight new passenger routes, two of which were seasonal and the others year-round.

#### Century Air Lines Schedules

**C**ENTURY AIR LINES' schedules now include a morning trip both east and west between Detroit and Chicago, and north and south between St. Louis and Chicago, in addition to its regular schedules, according to a report from L. B. Manning, Executive Vice-President. Leaving Detroit at 10:00 a. m., a plane arrives in Chicago at 11:30 a. m., while the plane leaving Chicago at 8:40 a. m. arrives in Detroit at 11:55 a. m. Between St. Louis and Chicago, the north-bound plane leaves at 9:00 a. m., and arrives in Chicago at 11:40 a. m., and the south-bound plane leaving at 9:15 a. m., arrives in St. Louis at 12:10 p. m.

#### Indianapolis Municipal Airport

**T**HE Indianapolis Municipal Airport started operations February 16, 1931, when the T. & W. A. transferred its base from Mars Hill airport. Full activities and the servicing of transient planes did not begin until late in March when the American Airways also moved to the new municipal port. The following statistics, therefore, are for the nine months of full operation from April 1, 1931, to January 1, 1932. During this period a total of 11,095 transport passengers cleared the port. Of this number 2,379 passengers arrived, 2,393 departed, and 6,323 were through passengers. There were 4,464 student flights totalling 587 hours in the air.

With the addition of the passengers carried by military pilots and short pleasure flights around the field and over Indianapolis, 13,812 passengers were flown from the Municipal Airport during the nine-month period. There was a total of 1,198 hours flown locally at the port and a total of 9,825 take-offs and landings. The growth throughout 1931 has been steady and consistent. Beginning with April the activity increased steadily until, in September and October, the fig-

(Continued on following page)

# The Conquest of the Air




NATIONAL-SHELBY Aircraft Tubing is carried in stock by distributors at convenient points throughout the country. It is kept in separate, individual lots with which actual test reports can be furnished at the time of delivery. Inquiries may be addressed either to the manufacturer or to the nearest distributor.

Power to drive faster and faster through the resisting element; strength to bear the tremendous tensions, pressures, and warping strains that great speed imposes, lightness to ride easily on the wind—a union of all of these with nicety of balance and direction nowhere else required, have been involved in man's conquest of the air.

Not the least important contribution to this success was the tubular steel frame, incredibly strong and as free from excess weight as the bony structure of a gull. In the development of suitable material for so exacting a use, NATIONAL-SHELBY Aircraft Tubing has kept pace with the most advanced engineering, from the earliest days of the industry until now. It is made to meet U. S. Army and U. S. Navy specifications. The uniformity of every piece is as near to the absolute as science and organization can go. Ask for descriptive literature or specific information on NATIONAL-SHELBY—

*America's Standard Aircraft Tubing*

NATIONAL TUBE COMPANY · PITTSBURGH, PA.

Subsidiary of United  States Steel Corporation

## NATIONAL-SHELBY AIRCRAFT TUBING

(Continued from preceding page)

ures for the early months were practically doubled. This entire movement was carried on without a single serious accident.

The mail cleared from Indianapolis over the period reported was 18,720 pounds inbound and 29,411 outbound. The increase by months during 1931 has been very marked as far as air mail is concerned.

**Fort Worth Municipal Airport Statistics**

**A**N increase in the number of airplanes and passengers flying in and out of the Fort Worth Municipal Airport, and the expenditure of approximately \$350,000 on the landing field and buildings featured aviation activities in Fort Worth, Texas, during 1931. Records compiled by Airport Manager William G. Fuller show that during the year 11,346 planes, carrying 34,154 passengers registered at the port, as compared with 9,490 ships and 30,080 passengers in 1930, and 4,511 ships and 4,446 passengers in 1929.

The landing field at the airport was graded and three hard-surfaced runways, 2,500 feet, 1,100 feet and 3,000 feet, respectively, were constructed to meet requirements of the Department of Commerce. A repair shop was erected and leased to the Texas Aero Corporation which installed equipment adequate for all types of airplane repair work.

The year left three transport companies in the field, namely, American Airways, United Air Lines, and Bowen Air Lines, offering passenger, mail and express service in all directions. Contemplated improvements include the enlarging of the field, and construction of a concrete taxiway from the runway to the hangar ramp.

**Pan American Airways Cuts Fare**

**A**REDUCTION in fares on the 36-hour rail-and-air service from New York, Philadelphia, Baltimore, and the principal intermediate cities direct to Havana and Nassau, and on the 44-hour direct service to Jamaica, has been announced by Pan American Airways System. The through service is operated on a new through tariff arrangement with the Pennsylvania, the Richmond, Fredricksburg and Potomac, and the Atlantic Coast Line railroads, and the Florida East Coast Railway, and has reduced round-trip fares by more than 20 per cent. Liberal stop-over privileges, applying to any intermediate point up to the four-month limit of the tickets, are allowed with the reductions.

In spite of depressed conditions of world trade, which have critically affected all other forms of transportation,

the Pan American airlines register a substantial gain in mail and express as well as passengers. Continuing a steady advance, air-mail volume increased over every route, showing a particular advance on the Eastern Trunk Airline from Brazil and Argentina, this mail increasing over three times. Air express recorded substantial gains, likewise, and by December had reached a volume of six tons each month. A gain of 20 per cent was recorded in number of passengers carried. An average of nearly 1,000 passengers each week traveled over the international airlines between the United States and Latin America during the year.

**Boston-New York Freight Service**

**D**AILY airplane freight service between Providence and Boston, Bridgeport, New Haven and New York, was inaugurated at the Rhode Island State Airport at Hillsgrove on January 20. The service, which connects Providence with New York in 1 hour and 45 minutes, started with a Cessna monoplane of the Hub Airways of Boston. The E. W. Wiggins Airways, Inc., are Providence agents for the new service.

Freight will be carried daily except Sundays and holidays. Packages will be limited in size to 20 by 30 inches.

**Air Parcel Express Line**

**T**HE inauguration of an initial unit of the first exclusive air parcel express service in the United States has been announced by L. B. Manning, Executive Vice-President of Century Air Lines, a division of the Cord Corporation. This organization operates between Chicago and Cincinnati, Ohio. Starting January 13, regular tri-motored Century air liners were loaded to capacity with packages from the Chicago Mail Order Company and dispatched non-stop to Lunken Airport at Cincinnati.

**Transport Operations July-November**

**S**CHEDULED air lines operating in continental United States carried 30,117 passengers in November, according to reports from 31 of the 37 companies operating. It has been announced by the Aeronautics Branch of the Department of Commerce.

Miles flown by the scheduled air lines reporting for the month were 3,311,368; express carried was 80,876 pounds, and passenger miles flown were 6,845,092.

Comparative statistics for July to November are given in the following tabulation:

	July	August	September	October	November	Total
Reporting companies.....	39	39	38	35	31	....
Operating companies.....	42	42	41	40	37	....
Passengers carried.....	62,433	64,937	59,779	47,665	30,117	264,931
Express carried (pounds).....	80,146	144,324	88,061	66,672	80,876	460,079
Miles flown.....	4,139,354	4,450,406	4,213,955	4,183,793	3,311,368	20,298,876
Passenger miles flown.....	13,484,110	14,138,731	12,983,713	10,587,389	6,845,092	58,039,035

**United Air Lines Statistics**

**A**CCORDING to a recent announcement from United Air Lines, its subsidiaries, Boeing, National and Pacific Air Transport and Varney Air Lines, registered a 232 per cent increase in the number of revenue passengers carried in 1931, flew 38 per cent more miles, and carried slightly more mail than in the previous year. Some of the figures given in the report are as follows: Mail carried, 2,420 tons; revenue passengers carried, 43,000; passengers between stations on coast-to-coast service, 23,000; mileage flown, 11,114,679. On its New York-Chicago-Pacific line, United Air Lines flew 6,500,000 miles, contrasted with 4,500,000 miles the previous year, and carried approximately 3,900,000 pounds of mail from coast to coast. Night flying covered 6,000,000 miles.

**New York-Chicago Time Cut**

**A**SAVING of an hour and a half during 1932 is promised by Transcontinental and Western Air on its New York-Chicago service. The elapsed time between these points has been cut to six and a half hours, and a new late-afternoon schedule between New York and Pittsburgh has also been added, according to an announcement made by Richard W. Robbins, President of the line. There is also to be a change in the transcontinental 36-hour schedule in the Eastern region and between New York and Kansas City.

**Proposed Municipal Airports Reported**

**T**HE Aeronautics Branch of the Department of Commerce has received information to the effect that Monticello, Ind., Oxford, N. C., Lima, Ohio, and Palestine, Texas, propose to establish municipal airports. Improvements are contemplated or under way on municipal airports located at Owensboro, Ky., and Del Rio, Texas.

It is also reported that airports have recently been established at El Dorado, Ark., Madera, Calif., Ukiah, Calif., Norwalk, Conn., Milford, Mass., Ada, Okla., Corvallis, Ore., Brownwood, Texas, Spearman, Texas, and Galax, Va. Proposed work has been indefinitely postponed on airports at Arkansas City, Ark., Wynne, Ark., Oakland, Calif., Ripon, Calif., Eagle, Colo., Baxter Springs, Kan., Osborne, Kan., Manomet, Mass., Amenia, N. Y., Blairsville, Pa., Greenville, Tenn., Duchesne, Utah, Disputanta, Va., and Harrisonburg, Va.



# STABILITY is also a measure of business!

Not only in an airplane, but in the organization back of the plane, stability today is the mark of genuine success. . . . Despite the trials of the aeronautical industry during the past year, the last two months of 1931 brought Bellanca almost seven times the volume of sales closed in the same period of the previous year. *The annual sales*

*were 29 2/3% greater than those of 1930.*

. . . These facts speak for themselves, eloquently indorsing the established value of Bellanca planes. Once more the gain in commercial airplane leadership, won by these sturdy, highly efficient products, confirms the truth of the statement, "Built As Only Bellanca Can Build."

**BELLANCA AIRCRAFT CORPORATION**  
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# BELLANCA

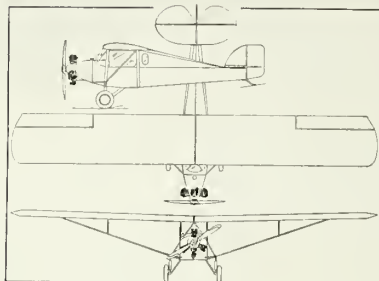
# THE CORBEN JUNIOR ACE MONOPLANE

**T**HE Corben Junior Ace is designed by the Corben Sport Plane and Supply Company of Peru, Indiana, builders of the Baby Ace single-place sport plane. It is a two-place side-by-side monoplane manufactured and distributed complete or in semi-built kits. These kits include all fittings, fuselage, tail unit, landing gear, controls, motor mount, and wing struts, factory welded. Wing spars are shaped and drilled. Leading and trailing edges are factory shaped, leaving only the assembling, fairing and covering to be done by the person who desires to purchase his ship in this manner.

This new sport plane is readily convertible from an open to a cabin model or vice versa within a few minutes. This is permitted by special design of the fuselage and different turtle decks. The absence of structural members around the cockpit affords unusual visibility in either model and permits the interior of the plane to be finished similar to that of the average car. A luggage compartment located behind the seat is accessible from either the inside or outside of the plane. In the cabin turtle deck two oval windows can be placed in the luggage compartment for good visibility to the rear of the ship. All control wires are concealed.

The gasoline tank is located under the cowling which eliminates the necessity of climbing over the plane when refueling. Extra wing tanks may be installed for increasing the cruising range. Control surfaces are large enough to allow good control at slow speed but are geared down to reduce to a minimum the possibility of over-controlling.

The wing structure is of spruce and



Corben Junior Ace with cabin attached

is fabric covered. Tie rods are employed for all internal bracing. False ribs along the leading edge are made of formed aluminum tubing. The leading edge in the slipstream is covered with plywood. Fuselage and tail unit are of welded steel tubing and fabric covered. The stabilizer is adjustable from the seat and is operated by worm gears, giving very fine adjustment. Wing struts are designed to eliminate the necessity of rigging, permitting the wings to be readily attached, or detached, for towing to and from the flying field, or for storage in small spaces.

The landing gear is of the split-axle type built of steel tubing. Coil springs are used in the shock struts and are so arranged as to check the rebound. This type of strut requires no attention on the part of the owner. The 20- by 4-inch tires are standard equipment. Cast alu-

minum wheels of special design consist of two halves held by three steel bolts which make tire changing easy. The hub cap fits inside of the wheel away from grit and dirt, reducing wear from that source and at the same time giving the wheel a good streamline appearance.

The Junior Ace is designed for either the Poyer 40 h.p. or the Szekely 45 h.p. air-cooled engine.

## Specifications

Span	.....36 feet
Chord	.....5 feet
Height overall	.....6 feet, 6 inches
Length overall	.....20 feet
Weight empty	.....520 pounds
Useful load	.....400 pounds
High speed	.....85 miles per hour
Cruising speed	.....75 miles per hour
Landing speed	.....28 miles per hour
Service ceiling	.....13,000 feet

## ECLIPSE VACUUM PUMP FOR INSTRUMENTS

THE Eclipse Aviation Corporation of East Orange, New Jersey, has placed upon the market an engine-driven instrument vacuum pump designed to replace the venturi used to operate suction-driven aircraft instruments such as the bank-and-turn indicator, artificial horizon, and directional gyro. The pump is equipped with a flange to fit the standard four-bolt gun synchronizer drivepad on the engine and a socket in the pump rotor receives the drive from the nut on top of the synchronizer drive shaft.

This pump has sufficient capacity to operate the three above-mentioned instruments at the normal throttled r.p.m. of the engine during a glide and will also operate all three instruments at an altitude of 10,000 feet at normal cruising speed. The pump will provide sufficient suction during the warming up period on the ground to insure the instruments operating correctly at time of take-off.

The pump is of the rotary-vane type with all wearing surfaces of thin wall nickel-iron. It requires no attention, lubrication being taken by a pressure line from the engine with a restriction in the pump limiting the oil used to a few drops per minute. It weighs 3¾ pounds.



The new convertible Corben Junior Ace two-place side-by-side open type monoplane





PERFORMANCE *plus*  
POPULARITY



It is significant that the latest as well as the older type ships in use today have this one feature in common—U. S. Royal Low Pressure Airplane Tires. Leading aircraft manufacturers have adopted them as standard equipment—private pilots and commercial operators have modernized their planes by changing over to them. As a result, U. S. Royal Low Pressure Airplane Tires enjoy a widespread popularity that is based upon superior performance.

**United States Rubber Company**

WORLD'S LARGEST  PRODUCER OF RUBBER

**U. S. ROYAL AIRPLANE TIRES**



## DIESEL ENGINES ON GOODYEAR AIRSHIP

**S**UCCESSFUL application of Diesel engines to lighter-than-air craft was announced recently by P. W. Litchfield, President of the Goodyear Tire and Rubber Company, following a round-trip flight of the Diesel-powered airship *Defender* from Akron to Packard Field, Detroit, 150 miles away. The *Defender* is the largest of the fleet of six Goodyear non-rigid airships and carries two engines mounted on outriggers outside the control car. These gasoline engines were exchanged for two 225-h.p. Packard Diesel engines adapted for airship use.

A number of test flights out of Wing-foot Lake dock were made following the delivery and installation of the Diesel engines. Noise and vibration were much less than had been expected from so powerful a powerplant. Fuel economy seemed to be satisfactory, and considerable stepping up of the cruising speed was indicated. While the cruising speed of the ship with gasoline engines was around 42 miles per hour, on the Detroit trip, the *Defender* with its twin Diesels stepped up to 55 without loss of fuel economy. The positive acceleration given by the Diesel type of engine was said to be satisfactory to the airship pilot and with the absence of electrical ignition there was no radio interference.

## THE LANIER VACUPLANE

**A**CCORDING to the designer, E. H. Lanier of Miami, Florida, the development of the Vacuplane was undertaken primarily with the aim of producing an airplane which would possess a

high degree of inherent stability, maneuverability, greater load-carrying capacity, and would require a lower production cost and a smaller housing space.

The basic airfoil is a Durand 13 with slight modifications and extremely low aspect ratio. The slotted opening on top is intended to increase the lifting power of the wing by utilizing the wing's under surface to a greater extent than in ordinary airfoils, but still retaining the lifting characteristics of the upper camber. The dihedral incorporated in the under surface of the wing, combined with the effect of internal pressure distribution, is claimed to improve the stability.

Regarding the lateral control, in the previous model the ailerons were located in the slipstream, immediately behind the propeller. While effective in this position, they were also very sensitive, required very little movement, and had to be operated with care to prevent over-control. For this reason, in model X-L-4, the location of the ailerons was modified, and it was found that they were effective even when the plane was moving at slow speed. In the model X-L-4, the wing surface was somewhat increased which resulted in better damping of the lateral control.

Equipment of the model X-L-4 includes a LeBlond 5DF 85-h.p. engine, a Hamilton metal propeller, N. A. C. A. cowling, and Goodyear air wheels. Models X-L-3 and X-L-4 were tested by Prof. F. H. Given, Director of Aeronautics, University of Miami, Florida.

The two photographs at the bottom of the page illustrate the latest version of the airplane designated as X-L-4. The end plates are intended apparently to decrease the effect of low aspect ratio. The lower right photograph shows the top opening and aileron arrangement.

### Specifications (Model X-L-4)

Gross weight.....1051 pounds  
Span of airfoil.....13 feet 9½ inches  
Chord through center line, 11 feet 2 inches  
Top area of cell.....101 square feet  
Wing loading, 10.4 pounds per square foot  
Take-off in calm wind  
(estimated) ... 40 to 45 miles per hour



## TAILLESS AIRPLANES

(Continued from page 85)

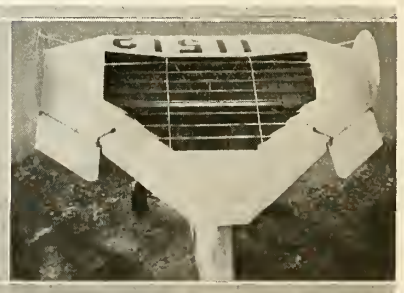
It is later replaced after the inner ends of the right and left wings are cemented in position. It is, of course, first cut to allow for the shape of the wing section. The ballast is embedded in the nose of the fuselage.

The bamboo skid is supported on a streamlined bamboo strut in the rear. This gives a certain resiliency to the construction, but it is questionable whether this is absolutely necessary. A close fitting bamboo skid flush with the fuselage would offer less resistance and would still protect the soft balsa.

The right and left wings are made separately from one-eighth by three-inch balsa board. The wing section is flat on the under surface and cambered on the upper surface. When mounted on the fuselage, the leading edge has a sweep-back of 20 degrees. Stiff paper is used for wing-tip controls and fin trailing edges. Both fins are given a slight turn outward at their trailing edges. This seems to improve directional stability. The combination elevator and aileron controls are, of course, upturned.

This glider has an excellent gliding angle and will soar beautifully on rising air currents. To date it has not been possible to check its flying and sinking speed characteristics, but its efficiency is outstanding for a model of this small size.

It is strongly recommended that experimenters who are interested in tailless airplanes either build this model, or at least construct some of the more simple paper designs shown in the accompanying Figs. 12 to 14. These models are a revelation in performance when flown indoors or in calm weather. Because of their light weight, their performance is limited to these conditions, but it is none the less remarkable. They serve admirably to demonstrate the underlying principles of the tailless airplane which one day may dominate other types owing to its inherently higher efficiency.



Latest experimental type of "Vacuplane" designed by E. H. Lanier

# A SMALLER WORLD IN 1932

The world is smaller this year — it will be even smaller, quicker, richer, as commerce and its servants increasingly travel the swift, shortened highways of the air.

Entering the greatest decade of the air, the General Aviation Manufacturing Corporation has concentrated all its administrative and manufacturing activities in the great Curtiss-Caproni plant at Baltimore, in order to unify the industry's highest resources in developing new and advanced types of aircraft.

Here are joined the skill and enterprise of world-famous designers and engineers — the experience of more than ten years of fine aircraft production — the vast modern manufacturing facilities of the Curtiss-Caproni plant — to combine new economies and advantages for plane operators and users.

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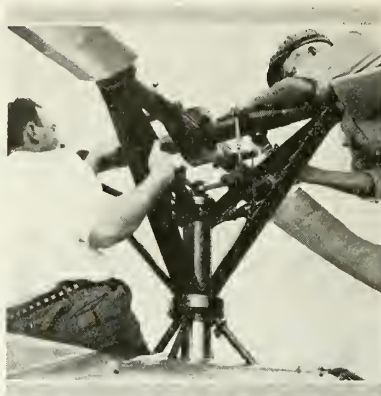
# THE WILFORD GYROPLANE

THE gyroplane differs from other forms of rotary aircraft as generally known. The main differences lie in the small span of the rotor, which is made possible through the high r.p.m. and a high-lift airfoil; the rigid feathering blades which generate a high lift without excessive weight or gyroscopic effect; and the rotor control which, combined with a stub wing, produces a lateral balance for vertical descent and landing in adverse conditions on rough ground.

It was under the difficult conditions in Germany during 1925 that the idea of the feathering gyroplane originated. Walter Rieseler, an aircraft designer before the War, and Walter Kreiser started the construction of such a machine in 1926. In the Fall of 1928, E. Burke Wilford, who had done considerable work for the Pennsylvania Aircraft Syndicate in perfecting devices to increase the safety of flying, visited Europe and purchased the patent rights of Rieseler and Kreiser. This marked the first American importation of basic patents for practical rotary aircraft.

The second phase of the development started in March, 1930, with the construction of another gyroplane at Mr. Inglis Upperco's factory at Keyport, N. J., and the two Germans came to the United States to supervise the work.

The machine then constructed had a welded steel tube fuselage with seating accommodations for only the pilot. The engine was an 85-h.p. Cirrus Mark III. The rotor, consisting of four rigid blades, had a span of 25 feet and a Goettingen 429 airfoil with a two-degree incidence and a five-degree sweepback in the blades. The ship was built without a stub wing and depended on the normal



Rotor mast of the Wilford gyroplane

airplane controls in the tail group, plus lateral control through the rotor by means of a change in the angle of incidence of the individual blades. The plane was only ground tested as the rotor gave insufficient lift, due to the wrong blade contour.

Meanwhile, an extensive program of wind-tunnel work was being conducted at New York University. This included a determination of lift and drag values, parachutal effect, determination of the most suitable setting and type of rotor blade, and comparison of different types of models. While this experimentation was being carried on, a complete study of existing aircraft, both of the fixed-wing and rotative type, was being made.

The third machine built was actually a modification of the second and the same fuselage was used. This work was carried out at Paoli, Pa., under the supervision of Mr. Wilford and his master mechanic, Clifford Applegate. The prin-

cipal changes were incorporated in the rotor, landing gear, control surfaces and the addition of a stub wing. The stub wing was the subject of study and, although such a wing was added, it is problematical whether it will be incorporated in the final design.

It is in the construction and operation of the rotor itself that the Wilford gyroplane differs primarily from other types of rotative aircraft. The blades of the present machine have a U. S. A. 35-B airfoil section with metal spars and ribs, and fabric covering. The opposite blades are rigidly interconnected, but are allowed freedom of movement about their axes, a movement which is somewhat similar in character to the feathering of an oar. They are also constructed with sufficient sweepback so as to place the center of pressure back of this feathering axis, which permits aerodynamic action to equalize the lift forces on the advancing and retreating blades through the change in the angle of incidence of the individual blades. The blades themselves have 60 square feet of lift area, which is approximately 12 per cent of the swept area. The entire rotor system is supported on the mast with individual journals for each blade extending 15 inches beyond the center where the spars of all blades meet, and adequate strength is incorporated in each blade to take care of any centrifugal or lift loads which may be imposed.

The control device extends through the center of the mast and is connected with controls in the cockpit. The unit which operates on the blades is essentially a simple ball arrangement which can be deflected laterally so as to change the angle of incidence of the advancing and retreating blades. This control mechanism, however, does not operate on the blades while they are in line with the fuselage.

The present machine has been flown at Paoli many times and is said to have adequate control and satisfactory performance. An outstanding characteristic is its exceptionally high lift for the size of the machine. All flight tests have been conducted with an 85-h.p. engine and a rotor span of only 25 feet. The machine takes off at less than 35 miles per hour and the rotor maintains an average speed of approximately 200 r.p.m.

Among the advantages claimed for the Wilford wingless gyroplane are the following: The use of rigid feathering blades to equalize the lift between the advancing and the retreating blades accomplishes the necessary change of incidence without the use of any flexible structure. This makes it possible to use a trailing center of pressure on a high-lift airfoil, therefore decreasing the drag and increasing the lift and aerodynamic efficiency. By limiting the feathering motion with springs or other means, it is possible to obtain lateral control in the



The Wilford gyroplane with rigid rotor blades having a span of 25 feet



Flight test of the Wilford gyroplane with an 85 horsepower Cirrus engine

rotating element so that, even in vertical descent, all controls of the machine function properly; also any residual rolling moments due to the moments of inertia of the blades themselves can be eliminated.

The rigid structure used for both automatic stability and control is said to weigh approximately the same as the centrifugal type of rotor, but with the advantages that all centrifugal forces are counterbalanced against each other, and are taken through solid structure which makes the operation of the rotating ele-

ment smooth and efficient. It also eliminates all wires, flexible joints, inter-bracing, and any fixed airfoils. By use of the high-lift section and the feathering action, autogiration of the rotor is improved. Due to the fact also that the opposite feathering blades are interconnected and have a sweepback which gives a trailing center of pressure, the lift of each blade is kept approximately equal in all positions of rotation, regardless of the direction of incidence or position of the machine.

## DIGEST OF FOREIGN TECHNICAL ARTICLES

Elsa Gardner

### BRITISH AERONAUTICAL RESEARCH

Aeronautical Research Committee Report for the Year 1930-31. (London) 89 pp., 5 figs.

**P**ROBLEMS investigated by the British Aeronautical Research Committee and some of their solutions obtained during the year are reviewed by R. T. Glazebrook, Chairman of the Committee. Reference is made to the recent reports and memoranda issued by the Committee (previously abstracted in *AERO DIGEST* for the most part), and a list of those published during the year under review is included. The Subcommittee reports describe the investigations more in detail, under the headings of accidents, fluid motion, interference, performance, wind tunnels, gyroplanes, airplane flutter, airplane vibration, airships, propellers, stability and control, spinning, load fac-

tors, engines, aircraft noise, structures, elasticity and fatigue, alloys, and meteorology.

The Engine Subcommittee reports two new Panels formed to deal with problems relating to carburetion and air intake, and the gumming and carbonizing propensities of lubricating oils, and describes developments in compression-ignition engines, supercharging, detonation, and bearings. The Subcommittee on Aircraft Noise gives a table of loudness levels of various noises and reviews various aspects of the noise problems which received attention. The Elasticity and Fatigue Subcommittee reports on the fatigue of single crystals of metal, influence of electro-deposited coatings on the fatigue resistance of steel, corrosion fatigue of single crystals, conditions de-

termining plastic flow in metals, testing of thin strip materials, strength of panel bracing, and torsion of metal tubes.

### AUTOMATIC OBSERVER

The R.A.E. Automatic Observer Mark IA. D. A. Jones. (British) Aeronautical Research Committee—Reports and Memoranda No. 1405, (Ae. 526), January, 1931, 6 pp., 6 figs.

**A**N instrument is described which has been designed to record automatically the simultaneous readings of instrument dials and is so constructed as to be readily installed in the radio cabin of an aircraft. A reproduction of a portion of a record obtained during a flight is given which demonstrates that the instrument provides a satisfactory means of recording simultaneously a series of readings of height, time, engine r.p.m., indicated speed, bubble inclinometer, and temperature.

### AIRPLANE MATERIALS

Materials Used in the Construction of Airplanes (Baustofffragen bei der Konstruktion von Flugzeugen), P. Brenner, *Zeitschrift für Flugtechnik und Motorluftschiffahrt*, Vol. 22, No. 21, November 14, 1931, pp. 637-647 and (discussion) pp. 647-648, 23 figs.

**T**HE important properties of aluminum and magnesium alloys, steel and wood, as well as their influence on the structure form of airplanes, were investigated for this report of the Deutschen Versuchsanstalt für Luftfahrt. The proved advantages of duralumin for land planes are pointed out and methods of protecting duralumin parts against corrosion in seaplanes are discussed. The popularity of copper-free aluminum alloys, such as magnalium, for floats and hulls of the future is predicted. The disadvantage of aluminum alloys in regard to low resistance to vibration is thought to be insignificant in view of their low sensitivity to tension rises at cross-sectional parts and grooves.

Magnesium alloys are found to be better than duralumin in strength, behavior towards vibration stresses, and notch sensitivity, but their corrosion in salt water restricts their applications in seaplanes. Rustless chrome steels are considered to offer the best solution to corrosion problems in seaplanes of the future.

Paper presented before the Wissenschaftlichen Gesellschaft für Luftfahrt.

### SPINNING EXPERIMENTS

Measured Spins on Aeroplane H. S. B. Gates. (British) Aeronautical Research Committee—Reports and Memoranda No. 1403, (Ae. 524), April, 1931, 5 pp., 3 figs.

**I**N the tests reported, a cautious exploration of the spin of airplane H was attempted as a preliminary to spinning experiments with a raised tailplane. Spins in either sense were characterized by a few slow steep turns, followed by a flick into an extremely fast and flattish spin (time of turn 1.2 seconds, incidence

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57 degrees). Recovery was immediate if attempted before the flick, and not difficult in spins to the left if delayed until after the flick. Recovery from the fast spin to the right was extremely difficult and the experiment was discontinued after two such spins had been done in which 40 and 34 turns were made before recovery.

### SPINNING EXPERIMENTS

Free-Flight Spinning Experiments with Single-Seater Aircraft II and Bristol Fighter Models, A. V. Stephens. (British Aeronautical Research Committee—Reports and Memoranda No. 1404, (Ae. 525), April, 1931, 12 pp., 10 figs.

THE results of free-flight spinning experiments on two models at the Royal Aircraft Establishment are discussed. A rotary launching gear was devised so that models could be released with a variety of spinning motions. It was found that models of both types could spin stably in two distinct ways at incidences in the regions of 30 and 65 degrees. The effect of moving the center of gravity further back was to increase the incidence of both kinds of spin. On spins at low incidences the effects of varying the mass distribution were very small. On spins at high incidence weights on the wing tips produced a marked increase in the incidence and rate of rotation, whereas loading the fuselage reduced both incidence and rate of turn.

Raising the tailplane to a position near the top of the rudder was found to give greatly improved recoveries from fast spins at high incidence, and fairing the fuselage was found to enhance these effects.

### PROPULSION FOR STRATOSPHERIC FLIGHT

Hyperaviation and Superaviation (Iperaviazione e superaviazione), G. A. Crocco. L'Aerotechnica, Vol. 11, No. 10, October, 1931, pp. 1173-1220, 20 figs.

DEFINING hyperaviation as flight at high velocities and low heights, and superaviation as flight at high velocities and stratospheric heights, the author discusses the forces required to attain very high velocities. He demonstrates that the forces will increase cubically for hyperaviation, but almost linearly for superaviation. He thinks, therefore, that very high velocities may be attained only in stratospheric flight and that the difficulties to be overcome are those which are due to the rarefaction of the air. He takes up in turn air-tightness of the cabin, respiration, temperature, control of aircraft, and the power necessary for propulsion.

The author explains the principle of jet propulsion which is obtained by taking in the air, compressing it by the motion of the airplane, and then exhausting it at the rear of the plane after giving it energy through combustion. He dis-

cusses a simple scheme on these lines which was suggested by Lorin in 1913. As developed by Steekin in 1929, it is said to give a greater efficiency than is obtainable with the engine-propeller unit.

The appendix contains two papers recently presented by the author before the Academia dei Lincei, and entitled "Aerodynamical Bodies with Negative Drag," and "Aero-thermodynamical Supporting Bodies."

### WING VIBRATION

Wing Oscillation, A. E. Parker. Flight (Aircraft Engineer Supplement), Vol. 23, No. 48, November 27, 1931, pp. 80-83, 4 figs.

TWO cases of wing vibration are worked out mathematically. In the first case, the effect of bracing is entirely omitted except in regard to the weight of the wing, and only the spars are considered. In the second case, the loading on the wings is not calculated as constant along the span but the wing is considered as without lift at the center section immediately above the cabin. Tapered wings are used and an elliptical distribution of pressure over the span, modified for the tapering of the wings, is assumed.

### AIRPLANE RANGE

Progress in the Range of Airplanes (Il progresso nell'autonomia degli aeroplani), M. Gasperi. L'Aerotechnica, Vol. 11, No. 10, October, 1931, pp. 1221-1240, 4 figs.

STARTING with the classical formula for range in the economical flight of an airplane, the various factors affecting the acting radius are discussed, including size of plane, aerodynamic efficiency, lightness, weight, fuel consumption, and engine efficiency. An increase in radius of 8 per cent for giant planes and an improvement from 16 to 21 in efficiency for the all-wing monoplane with retractable landing gear and Diesel engines are predicted. The percentage increase of radius permitted by improvements to each of the factors is deduced and the possibility of attaining in the immediate future a range more than double the maximum of today is assured. A tri-motored plane with Diesel engines which is capable of a theoretical range of 30,000 km. is described.

### CORROSION TESTS

Apparatus for Testing Practically the Corrosion of Metals (Apparecchi per prove pratiche di corrosione dei metalli), M. Gambioli. Rivista Aeronautica, Vol. 7, No. 11, November, 1931, pp. 297-305, 5 figs.

THE author explains the theoretical character of corrosion and quotes a recent paper by G. Guidi describing the different arrangements existing for the study of metal corrosion in aircraft construction. He also refers to the new apparatus developed in the Royal Aeronautical Laboratories for reproducing rapidly and in conditions as nearly na-

tural as possible, the corrosion produced by salt water on protected metal parts. He concludes with details of the equipment he designed himself for studying the corrosion of aircraft materials.

### CORROSION PROTECTION FOR MAGNESIUM ALLOYS

The Protection of Magnesium Alloys Against Corrosion, H. Sutton and L. F. Le Brocq. Engineering, Vol. 131, No. 3440, December 18, 1931, pp. 771-772.

METHODS are described for protecting magnesium alloys against corrosion to make them available for use in aircraft and other construction where rigidity and lightness are required. The methods under discussion include the adding of metals to magnesium to produce an alloy with useful mechanical properties; coating with other metals by Sherardizing, calorizing, and the Schoop metal-spraying processes; the production of a protective film by chemical means (dipping process); the production of a coating by anodic or cathodic treatment; and painting or enameling.

It was found that a substantial improvement in the corrosion resistance of commercially pure magnesium and magnesium-rich alloys could be obtained with surface films, produced during immersion of the cleaned pieces of magnesium or magnesium alloy in aqueous solutions of di-chromates and chromates. Application of lanolin to chromate-treated samples as a supplementary protective results in a considerable increase in the resistance to corrosion under the severe conditions of sea-water spray test. Preliminary experiments with samples treated with enamels indicated that by the use of cellulose enamels as supplementary protectives on samples previously chromate-treated, a fair degree of resistance to severely corrosive conditions may be obtained. Cleaning with dilute nitric acid resulted in considerable dimension losses.

Paper presented before the Institute of Metals at Zurich.

### TESTING DIESEL FUELS

Ignition Quality of Fuels in Compression-Ignition Engines, G. D. Boerlage and J. J. Broeze. Engineering, Vol. 131, Nos. 3435, 3438, 3440, November 13, December 4, and 18, 1931, pp. 603-606, 687-689, and 755-756, 26 figs.

METHODS obtained by the research department of the Royal Dutch Shell Group for rating the ignition quality of fuels in compression-ignition engines, are discussed and a series of correlating results secured with tests on other types of engines are described. It was found that by throttling it was possible to make smooth fuels run roughly and by supercharging it was possible to make rough fuels run smoothly. A curious knock paradox was observed during throttling, the knock increasing with diminishing maximum pressures and decreasing with increasing maximum pressures. The critical point where parts 1

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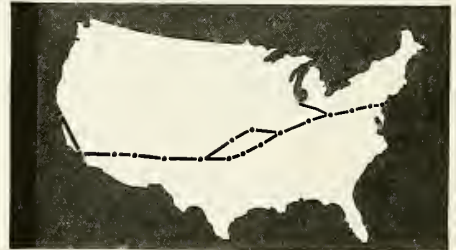
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(Continued from preceding page)

and 2 of the rate of pressure rise curve meet, corresponded with the audibility knock figure and was more accurately determined.

It was discovered that, although roughness increased with ignition delay, smoothness of running might be obtained after abnormally long delay periods. Direct audibility knock measurement under fixed engine conditions did not necessarily put fuels in the correct order of merit. Some influence of volatility on height of the rate of pressure-rise curve was indicated by slower burning with less volatile fuels, although it was not possible to measure the difference. The delay period was dependent, apart from the engine characteristics, on the chemical properties of the fuel. A comparison of delay curves formed the basis of further development of a fuel-testing method explained. It was observed that knocking of all fuels began within narrow limits at the same ignition delay. Large engines and engines with very high compression were far less sensitive to ignition quality. Some influence of viscosity and leakage appeared.

### WIND GRADIENTS

Note on Change of Wind with Height, L. W. Bryant. (British) Aeronautical Research Committee—Reports and Memoranda No. 1407 (Ae. 528), March, 1931, 8 pp., 3 figs.

**I**N this report the results of four sets of observations made for wind gradients at sea are collected and analyzed on the basis of the eddy-conductivity theory due to G. I. Taylor. It is thought probable that the largest gradients occur at sea when eddy conductivity throughout the first few thousand feet has a low value corresponding to overcast conditions and a light wind. The lowest gradients occur when the sky is clear, sunshine brilliant, and the wind gusty and moderate to strong.

The formula derived by Hopf and Fromm from experiments with smooth or moderately rough pipes, and used by Prandtl and Tollmien in a study of wind gradients, was found to fit the average curve for land surfaces and was not far from agreement with average sea conditions. No definite evidence appears that wind gradients over the sea differ notably from those over flat country.

### LUBRICATING OILS

Action of Antioxygens in the Oxidation of Unsaturated Fatty Oils. III. Relation Between the Induction Period in Oxidation and the Catalytic Effect on Driers. IV. Oxidation of Triolein. B. Yamaguchi. Tokio Imperial University—Aeronautical Research Institute—Report Nos. 74 and 75, Vol. 6, Nos. 8 and 9, pp. 219-235 and 237-250, 9 figs.

**T**HESE reports are a continuation of previous communications dealing with the action of antioxygens in the oxidation of unsaturated fatty oils (and abstracted in AERO DIGEST). No. III takes

up the occurrence of induction period and the action of driers on the oxidation. It was found that the occurrence was due to the antioxygenic action of unsaponifiable material which the oil contains, including sterols. Copper oleate, lead oleate, and manganese oleate were found to shorten efficiently the induction period of olive oil, suppressing the antioxygenic action of unsaponifiable material.

The results of the investigation of the oxidation of triolein, reported in No. IV, seem to give additional support to the theory established in the previous papers on the mechanism of the oxidation of unsaturated fatty oil and on the inhibitory action of antioxygens. The oxidation induction period of triolein, if it were present at all, was very small at 100 degrees Centigrade. The antioxygenic actions of  $\alpha$ -naphthylamine and hydroquinone for triolein are quite similar to those of olive oil.

### AIRSHIP MOTIONS

The Motion of H. M. A. R-101 Under Certain Assumed Conditions, D. H. Williams and A. R. Collar. (British) Aeronautical Research Committee—Reports and Memoranda No. 1401 (Ae. 522), May, 1931, 17 pp., 28 figs.

**T**HIS report is the result of a request made by the Court of Inquiry into the disaster to the R-101 airship, that the National Physical Laboratory assist Professor Bairstow in calculations relative to the motion of this airship under certain assumed conditions. These assumptions included the loss of gas from a forward gas bag, various amounts of heaviness, specified elevator movements, atmospheric disturbances, and increase of drag.

One case gave a flight path approximating the final path of the ship, and included all the above assumptions. Another case showed that the ship, undamaged and in trim, with the same amount of gross heaviness, under identical atmospheric conditions, and with the same elevator movements, would not have experienced more than normal oscillation.

### AIRSHIP STRESSES

A Contribution to the Analysis of Primary Stresses in the Hull of a Rigid Airship, L. Chitty and R. V. Southwell. Royal Aeronautical Society Journal, Vol. 35, No. 252, December, 1931, pp. 1103-1137, 8 figs., 9 tables.

**T**HE reported investigation of airship stresses was conducted at the request of the Aeronautical Research Committee. A tubular framework is assumed with longitudinal and crossed diagonal members connected by pin joints to a series of transverse rings so as to form a cylindrical tube comprising any number of exactly similar bays. The effects of the forces applied at the joints of the tubular framework and acting in directions parallel to the longitudinals were investigated. The aim of the paper

is to provide the designer with a means of obtaining, without excessive expenditure of labor, the exact solutions for a parallel tube having any number of bays. With an increasing number of bays, the labor hardly increases at all.

### AERODYNAMICS

Experiments on the Flow Past a Rotating Cylinder, A. Thom. (British) Aeronautical Research Committee—Reports and Memoranda No. 1410 (Ae. 531), March, 1931, 13 pp., 16 figs.

**A**S earlier experiments gave no information regarding the conditions close to the surface of a rotating cylinder, a series of measurements in the boundary layer was made and the results are described in this report. From the experiments it appeared that for a cylinder rotating in still air, the effective coefficient of viscosity increased rapidly with the distance from the surface.

The static pressure close to the surface, as obtained by the small static tube, is compared with that obtained by a different method in Reports and Memoranda No. 1082. The writer has elsewhere shown that the circulation around a contour enclosing a rotating cylinder some distance from the surface corresponds with the observed lift. In the present report it is shown how the circulation decreased rapidly in the first millimeter from the surface and thereafter more slowly as it approached the value corresponding to the lift.

### HEAT TRANSFER

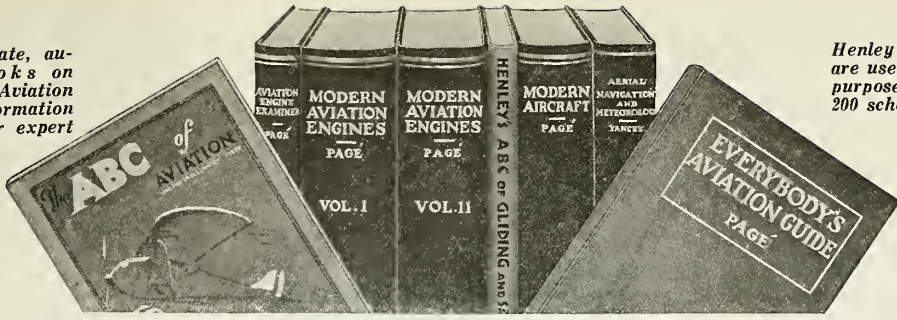
On the Relation Between Heat Transfer and Surface Friction for Laminar Flow, A. Fage and V. M. Falkner. (British) Aeronautical Research Committee—Reports and Memoranda No. 1408, (Ae. 529), April, 1931, 30 pp., 12 figs.

**T**HE report gives a mathematical theory of the heat transfer from a surface over which the fluid flow in the boundary layer is laminar and two-dimensional, when the heat flow is steady. A general differential equation for heat transfer has been obtained from a consideration of the heat balance at any point in the boundary layer, and after simplification, this equation has been solved by artifices similar to those used to obtain a solution of the boundary layer equations.

The solutions obtained were adapted to two problems of practical interest, namely, the heat transfer from a plane placed in a fluid in the direction of motion, and that from a generator strip of a circular cylinder. In each case, the relationships were obtained between the intensity of the heat transfer and surface friction. These theoretical relationships were compared with those obtained from measurements of the heat transfer from a thin platinum foil placed in a wind stream and from a nickel strip embedded just below the surface of a cylinder.



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Starting with the manufacture of the XPW-8 type and proceeding through to the P-6E model Hawk now in production in the Curtiss Aeroplane & Motor Company's plant, many interesting design features have been incorporated in these airplanes to make them more satisfactory for the military operations of pursuit, fighter and combat units.

Several foreign countries have also taken great interest in it and as a result this type of airplane has been delivered abroad to Cuba, Chile, Japan and the Dutch East Indies.

The following summary gives brief descriptions of the 382 Hawks produced in nine years and shows their development since the year 1923. Except where otherwise noted, a single ship of that particular model was built.

1923. (Model XPW-8). Original Hawk design. Powered with Curtiss D-12 water-cooled 435-h.p. engine. Straight wings with wing radiator. High speed 171 m.p.h. Delivered to U. S. Army Air Corps for tests. Two built.

1924. (PW-8.) Pursuit-type airplane, equipped with a D-12 engine. One of these airplanes flew from coast-to-coast between dawn and dusk. Twenty-five built.

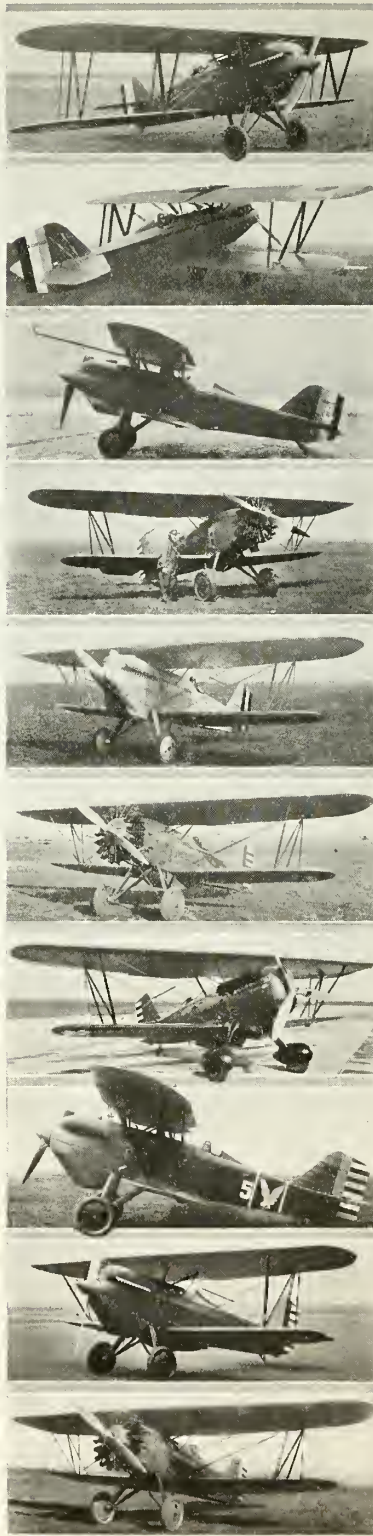
1925. (XPW-8A.) Similar to the PW-8 with the exception that this airplane had less wing area and an underslung radiator. High speed 178 m.p.h.

(XPW-8B) Built along the lines of the XPW-8A. Wings changed to tapered type of thicker section, giving greater maneuverability.

(P-1) Powered with a D-12 engine. Tapered wings and underslung radiator. High speed 163 m.p.h. Ten built.

(P-2) Based on the construction features of the P-1 for the Air Corps with the exception that a 510-h.p. Curtiss water-cooled V-1400 engine was installed. High speed 172 m.p.h. Five built.

(F6C-1) Built for the U. S. Navy. Tapered wings, underslung radiator and



Some types of Curtiss "Hawks" developed for the U. S. Army and Navy between the years 1923 and 1931

D-12 engine. Either wheel-type or float-type landing gear. High speed 167 m.p.h. as a land plane or 160 m.p.h. as a sea-plane. Five built.

(F6C-2) Similar to the F6C-1, but with wheel-type landing gear adapted for landing on the deck of an airplane carrier. Four built.

1926. (XF6C-3) Constructed experimentally for both land and sea operations. Equipped with D-12 engine. Delivered to U. S. Navy for tests.

(F6C-3) Based on the development of the XF6C-3 including the necessary installations for deck landings. Thirty-five built.

(P-1A) Built for the U. S. Army Air Corps. Tapered wings, underslung radiator and powered with a D-12 engine. Twenty-five delivered to the U. S. Army Air Corps, eight to the Chilean Government and one to Japan.

(XP-3) Similar to the P-1A except that it was powered with a Curtiss R-1454 radial air-cooled engine of 390 horsepower.

(XAT-4) Built experimentally along the lines of the P-1A for use as an Army pursuit training plane with a 180-h.p. Wright E water-cooled engine installed.

1927. (AT-4) Based on the XAT-4 airplane, for pursuit training. Thirty built.

(AT-5) Pursuit trainer similar to the AT-4 except powered with a Wright "Whirlwind" 220-h.p. air-cooled engine. Five built.

(P-1B) Tapered-wing type powered with D-12 engine. Twenty-five delivered to the U. S. Army Air Corps and eight to the Chilean government.

(XP-3A) Similar to the XP-3 except that the engine was a 410-h.p. Pratt & Whitney "Wasp".

(XP-6) Constructed along the lines of the P-1B with added power of a Curtiss "Conqueror" 600-h.p. engine. High speed 176 m.p.h. This airplane with a high-compression "Conqueror" installed developing 700 h.p. made a speed of 191 m.p.h.

(XP-6A) Built from a P-1A and powered with a 730-h.p. high-compression engine, and developing a speed of 210 m.p.h.

(XF6C-4) Constructed experimentally for the U. S. Navy for land and deck landing purposes. Powered with a Pratt & Whitney "Wasp" 410 h.p. engine.

(F6C-4) Constructed for the U. S. Navy along the lines of the XF6C-4 airplane for aircraft-carrier operations. Thirty-one built.

(XF6C-5) Similar in design to the F6C-4, but powered with a Pratt & Whitney "Hornet" 525-h.p. engine.

1928. (AT-5A) Pursuit training type built for the U. S. Army. With tapered wings and Wright "Whirlwind" 220-h.p. engine. Thirty-one built.

(P-5) Pursuit type for high altitude

work constructed for the Army. Powered with a D-12 engine, equipped with outside supercharger. High speed 174 m.p.h. at 25,000 feet; ceiling 32,500 feet. Five built.

(P-3A) Powered with Pratt & Whitney "Wasp" 410-h.p. engine. Five built.

1929. (P-1C) Similar to the P-1B in design, but equipped with D-12 engine. Thirty-three built.

1930. (P-6) Redesignated from a P-1C and powered with 600-h.p. water-cooled Curtiss "Conqueror" engine. High speed 180 m.p.h. Nine built for the U. S. Army, one for Japan and eight for the Dutch East Indies.

(P-6S) Similar to the P-6 with the exception that it was powered with a Pratt & Whitney "Wasp" engine. Three delivered to the Government of Cuba.

(P-6A) Constructed like the P-6 with the exception that a Curtiss "Conqueror" chemically-cooled power plant was used. Nine delivered to the U. S. Army Air Corps.

(YP-20) Experimental type with a 575-h.p. Wright "Cyclone" air-cooled engine, wheel fairings and anti-drag ring. High speed 193 m.p.h.

1931. (XP-22) Built for demonstration to the Army. Powered with a high-compression chemically-cooled Curtiss "Conqueror" engine and having new design single-strut landing gear, wheel fairings, etc. High speed 204 m.p.h.

(P-6E) Similar to the XP-22 in all details. Building for the U. S. Army Air Corps. Forty-six ordered.

Ten typical Hawk airplanes are shown in the illustration on the opposite page. From top to bottom they are: (top) PW-8; PW-8A; PW-8B; AT-5; F6C-1; P-3A; P-6E; XP-6; P-1C; (bottom) XP-3A.

## RECENT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N. W., Washington, D. C., at the rate of 20c each. State patent number and inventor's name when ordering.

Parachute. Leroy Askam, Milford, Conn. (1,834,370)

Heavier-than-air airship. Emil W. Paslak and Vine L. Mullendore, Denver, Colo. (1,834,417)

Airplane landing gear. Charles B. Schumacher, Pittsburgh, Pa. (1,834,427)

Airplane. Maurice Lowman, Birmingham, Mich. (1,834,465)

Air cell for aircraft. Charles S. Hall, Los Angeles, Calif. (1,834,614)

Safety device for airplanes. Le Roy St. C. Jerome, Glanford Station, Ont. Canada (1,834,623)

Aircraft construction and method of making same. Earl J. W. Ragsdale, Norristown, Pa., assignor to Edward G. Budd Mfg. Co., Philadelphia, Pa. (1,834,642)

Apparatus for lowering mail bags and other loads from aircraft. Harold E. S. Holt, London, England. (1,834,840)

Wing adjusting device. Earl Metzler, Greensburg, Pa. (1,834,858)

Control gear for aircraft. Franz Mitchel, Baumshulenberg-Berlin, and Manfred Grabarse, Aldershof-Berlin, Germany (1,834,859)

Propeller. Charles B. Baughn. Vasalia, Calif. (1,834,888)

Aircraft. Ernest W. Dichman, New York, N. Y. (1,835,022)

Dirigible. Carlos Barrera, Jersey City, N. J. (1,835,260)

Airplane wing covering. William L. Lewis and Frederick H. Rohr, San Diego, Calif., assignors to Solar Aircraft Co., same place (1,835,312)

Airplane landing gear. Guiseppe M. Bellanca, Wilmington, Del. (1,835,368)

Airplane construction. Guiseppe M. Bellanca, Wilmington, Del. (1,835,369)

Airplane fuel tank. Guiseppe M. Bellanca, Wilmington, Del. (1,835,370)

Airplane landing gear. Guiseppe M. Bellanca, Wilmington, Del. (1,835,371)

Parachute for airplanes. Charles Kesses, New York, N. Y. (1,835,498)

Airfoil. Harry H. Semmes, Chevy Chase, Md., assignor to Bendix Aviation Corp., New York, N. Y. (1,835,532)

Airplane. Glen H. Bowlus, Alhambra, Calif. (1,835,630)

Airplane fuselage fitted with arrangements for carrying and dropping large bombs. Gianni Caproni, Rome, Italy. (1,835,846)

Aircraft propeller. Felix M. Covey, Duluth, Minn. (1,835,849)

Propeller. John Squiers, Detroit, Mich. (1,835,913)

Aircraft propeller. Felix M. Covey, Duluth, Minn. (1,835,933)

Apparatus for use in the formation of trails of visible, luminous, or poison-laden material from aerial or other craft. John C. Savage, London, England. (1,835,970)

Airplane landing and launching mechanism. Constant A. Audrain, Havana, Cuba. (1,836,010)

Carburetor for aircraft engines. Tranquillo Zerbi, Turin, Italy. (1,836,300)

Motor-releasing system for airplanes. Julien A. Gehrung, New York, N. Y. (1,836,319)

Airplane (gyro type). Reginald E. Wike, Detroit, Mich. (1,836,351)

Ice-adhesion breaker for aeroplanes. Lester F. Barlow, Detroit, Mich., as-

signor to McCord Radiator & Mfg. Co., same place. (1,836,432)

Irreversible control for aircraft controls. Joseph Blondin, Los Angeles, Calif. (1,836,437)

Airplane. Wilbur A. Hammond, Los Angeles, Calif. (1,836,592)

Flying apparatus. Edouard A. Perrin, Le Vesinet, France. (1,836,617)

Device for dropping of solid bodies from aircraft. Josef Tritschler, Basel, Switzerland (1,836,633)

Airplane. Joseph Herbeck, Los Angeles, Calif. (1,836,663)

Aircraft controlling means. Max J. Palmquist, Chicago, Ill. (1,836,681)

Propeller. Frank W. Caldwell, Dayton, Ohio, assignor to Hamilton Standard Propeller Corp. (1,836,700)

Airplane collapsible undercarriage for alighting on land and water. Rene A. A. Couzinet, Levallois-Perrett, France. (1,836,704)

Flying machine of the heavier-than-air variety. Ben E. Brown, Lawrence, Kan. (1,836,806)

Air float. Joseph Mego, West Orange, N. J. (1,836,928)

Aeronautical propeller and method of making the same. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co., same place. (1,836,989)

Means for controlling airplanes. Frederick Handley Page, London, England, assignor to Handley Page, Ltd., same place. (1,837,132)

Airplane. Heralclio Alfaro, East Cleveland, Ohio. (1,837,186)

Changeable pitch propeller. Harry E. Eustis, Elizabeth, N. J. (1,837,318)

Automatic parachute. Giovanni E. Elia, Rome, Italy. (1,838,035)

Aircraft, especially aircraft of the amphibious type, including means of constructing and operating the same. Igor Sikorsky, assignor to Sikorsky Aviation Corp., Wilmington, Del. (1,838,044)

Air-cooled engine for aircraft. William Fischer, Akron, Ohio. (1,838,054)

Water-cooling apparatus for seaplane engines. Adolf Rohrbach, Berlin, Germany, assignor to Rohrbach Patents Corp. (1,838,155)

Airplane. Rudolph W. Schroeder, Glencoe, Ill. (1,838,194)

Airship. Joseph M. Bourland, Richmond, Calif. (1,838,248)

Propeller turret for propulsion and steering of aeroships. Samuel E. Hitt, Elyria, Ohio. (1,838,258)

Hydroairplane. Vincent J. Burnelli, New York, N. Y., assignor to Upperburnelli Corp. (1,838,297)

Gyroscopic airplane. Hervey M. Salisbury, Walnut Grove, and Arthur E. Miller, Sacramento, Calif. (1,838,327)

Airplane. William B. Stout, Detroit, Mich., assignor to Ford Motor Co., Highland Park, Mich. (1,838,334)

# NEW EQUIPMENT AND METHODS

## PORTABLE BEACON TRANSMITTER

**T**HE Aeronautical Division of the U. S. Army has purchased a portable visual and aural radio beacon designed and developed by the Westinghouse Electric and Manufacturing Company. This beacon is part of the U. S. Army Air Corps' extensive experimental program to perfect equipment for safe blind landing.

The portable apparatus will operate in conjunction with the main beacon which will locate the airport to the pilot while the portable unit will locate the runway. The portability of the equipment permits the choice of the best runway for the conditions at the field at the time of a plane's arrival.

The transmitters, loop assembly and the gas-engine generator unit are to be located on one truck with the power plant near the front. The transmitter and the loops will extend from the rear with the position of the loops so placed that when driving the truck into the wind the radio beam will be in the right location for landing into the wind.

The transmitter is capable of sending out signals for reception by either the aural or visual type of beacon receiver. For the aural type, a 720-cycle tone modulation is placed on the carrier. The output to one loop is keyed to send out the letter *A*, and the other loop is keyed to send out the letter *N*. Other suitable characters also may be used by changing the keying unit. The time relation between the two characters is such that if the plane is on the course the two characters interlock and only a long dash is heard. Position to the right or left of the beam gives a signal in which one of the characters predominates.

On the visual type of transmission, the carrier of one loop is modulated with 65 cycles, and the carrier of the other with 86 2/3 cycles. If the plane is on the course, the two signal strengths are equal and if the output of the beacon receiver is applied to a reed indicator, both reeds show



Portable radio beacon transmitter

the same amplitude of vibration. If the plane is on one side or the other of the course, the amplitude of vibration of one reed is greater than the other and indicates to which side the plane is off. In some cases direct-reading instruments are used instead of the reed indicator.

The transmitter, rated at 100 watts per loop over a frequency range of 225 to 375 kilocycles is mounted on a single spring-supported frame to protect it against shock during transportation. Tests have indicated that a range of 15 to 25 miles may be expected. There are two radio frequency outputs, each of the same frequency and same power level, but in quadrature time phase. These two outputs are put on two loops at right angles to each other, giving a rotating field carrier (a carrier having equal signal strength in all directions) and two figure-eight stationary side bands giving a four-course beacon. If the phase shifter is shorted out, the two radio frequency outputs are in phase giving a figure-eight carrier and a resultant two-course beacon. Links are provided on the transmitter for shorting out the phase shifter.

The loops are collapsible and made of treated maple, mycalex insulated. They are mounted very close to the transmitter and are made a part of the power amplifier tank circuits to eliminate the need for coupling and additional tuning circuits. This increases the efficiency slightly and simplifies the control. To minimize the coupling between the two loops, the leads between loops and transmitter are transposed at intervals.

The complete power supply for the transmitter for either aural or visual type of beacon is obtained from a gasoline-engine generator unit, consisting of an engine and six generators. The engine is a 10-h.p., 4-cylinder, 4-cycle, 1800-r.p.m., water-cooled type equipped with a mechanical governor for speed control. Coupled to the engine through a Falk spring-type flexible coupling is a 500-watt, 110-volt exciter and a 750-watt, 2500-volt plate generator. Just back of the coupling a link-belt chain drives 300-watt, 110-volt, 1-phase, 65-cycle and 300-watt, 110-volt, 1-phase, 86 2/3-cycle generators at 1300 r.p.m. At the other end of the coupled generator is another link-belt chain drive which drives a 300-watt, 110-volt filament generator and a 400-watt, 110-volt, 1-phase, 720-cycle a. c. generator at 3600 r.p.m. These changes in speeds were necessary in order to obtain the proper frequencies. The transmitter weighs 350 pounds, the engine generator 1100 pounds, and the portable loops 250 pounds.

In addition to this transmitter, the Westinghouse company has developed a universal beacon receiver for use with this type of equipment, which is designed to receive signals from an aural-type beacon, a visual-type beacon, and will also receive telegraphic or telephonic messages.

## ELGIN CLOCKS AND COMPASS

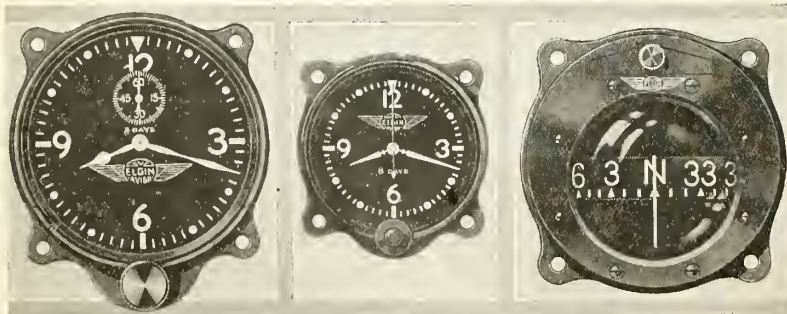
THE Aircraft Instrument Division of the Elgin National Watch Company announces the addition of a new compass and two new clocks to its line of instruments.

The Model CG compass was developed to meet the requirements of the Army Air Corps and present Air Corps specifications were drawn up from this model. The most striking feature is the elimination of all shock absorbing members between the bowl and instrument card and the substitution of a card which is spring suspended from the pivot, thus absorbing shock and vibration.

The completely new compass is light and compact. Its mounting dimensions make it interchangeable with any A-N standard instrument of the 2 3/4-inch dial size.

Model WC clock has an 8-day, 7-jewel movement. This clock is of the front wind type and has a sweep second hand which can be read at a glance. In spite of the small size of this model, the dial is 1 7/8 inch, making it interchangeable with A-N standard instruments such as oil pressure gauge and thermometer.

Model WD clock is of the standard



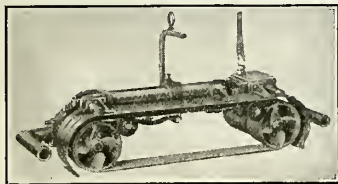
Two new Elgin clocks and latest compass, illustrations exactly one-half full size

2¾-inch dial size, 8 day and 7 jewel with front wind mechanism. Both clocks are adjusted to two positions and temperature to meet the requirements of Army and Navy specifications. All three instruments are cased in a molded phenolic composition.

**CONTINUOUS BELT SANDER**

MANUFACTURED by the Chicago Pneumatic Tool Company, this portable machine used for grinding and polishing straight and curved surfaces of wood or metal is particularly useful in smoothing down welds, smoothing wood or metal panels, etc., for aircraft work.

A flexible endless belt carries the abrasive or polishing medium on its outer surface, being driven by two Hicycle motors, one at each end. The motors have a low slip or drop in speed under load, so that the high cutting speed of



the abrasive belt is maintained under varying loads or belt pressures.

The totally enclosed motors effectively prevent the ball-bearing lubricant getting out onto the work and foreign matter from getting into the motor or bearings. This feature permits the machine to be used for grinding and polishing work that is to be painted, where it is essential that no oil or grease come in contact with it. The net weight of the machine is 62 pounds and the width of belt is 2¾ inches.

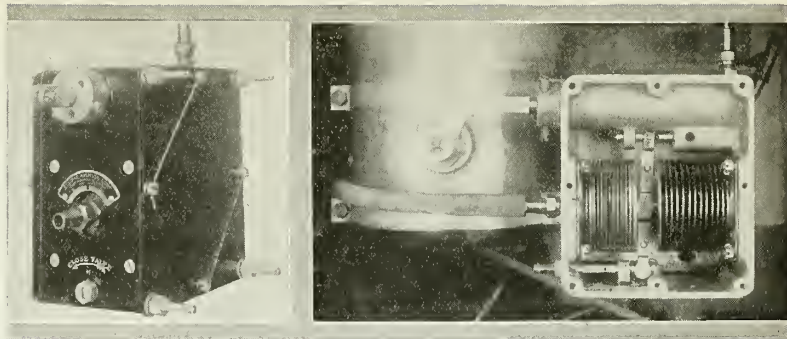
**FLEXIBLE METALLIC TUBING**

A SEAMLESS, flexible metallic tubing, which is claimed will find an important place in practically every industry, has just been placed on the market by the Bendix Aviation Corporation.

The new product can be effectively used in any of these general applications:

Flexible connections between moving parts; absorption of vibration and conveyance of liquids, semi-liquids, steam or gas. Machinery installations can be simplified by eliminating clumsy bends in piping while maintenance is reduced materially because the tubing eliminates slip and ball joints, thus reducing packing and shutdown costs. Likewise, replacement due to wear or deterioration is reduced.

The Bendix hose has been applied to such widely varied uses as lubrication, electric wiring conduits, exhaust pipes, radiator hose, shielding airplane radio, hydraulic and airbrake systems. It has



Eclipse automatic supercharger regulator; view at right shows installation

withstood pressures of 10,000 pounds to the square inch and temperatures of over 500 degrees.

The hose is seamless from the tip of one fitting to the tip of the fitting at the opposite end because the fittings are brazed or welded, forming an integral part of the hose. This construction prevents leaks developing in the hose and breaks occurring between the hose and its fittings, as frequently happens with interlocked or locked joint metal tubing.

Made of special bronze alloy seamless pipe, the Bendix hose is corrugated in round-thread single lead deep wall form and does not contain welded, brazed or interlocked joints.

A protective casing, braided from copper, is designed to cover the hose with either one, two or three layers, depending on the pressure the hose must withstand. As a protection against mechanical damage to the braid covering and to

distribute the flexing action, the manufacturer recommends use of an interlocked, unpacked galvanized steel casing over all.

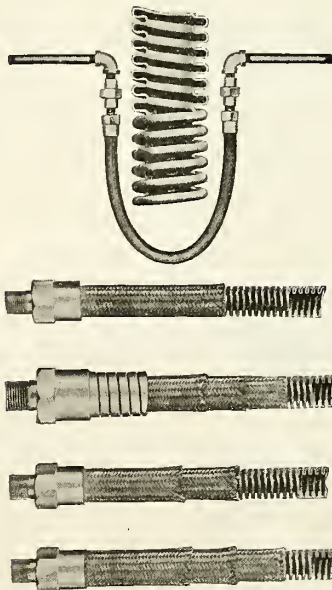
The new product is being made by the Bendix Stromberg Carburetor Company, subsidiary of the Bendix Aviation Corporation at South Bend, Ind., and is being manufactured at present with internal diameters of 3/16, ¼, ⅜, ½, ¾ and 1 inch.

**SUPERCHARGER REGULATOR**

THE Eclipse supercharger regulator, produced by the Eclipse Aviation Corporation, also a Bendix Aviation Corporation subsidiary, provides an automatic means for regulating the output of any type of supercharger, or for limiting the manifold pressure in an over-compressed or "boosted" engine. It is entirely automatic in operation and relieves the pilot of the necessity of continually adjusting the supercharger control with changes of engine speed or altitude.

The operating mechanism consists of two metal bellows actuating a needle valve that maintains or releases engine oil pressure on a servo-piston, connected to the operating control. One of the bellows is sealed and evacuated, with a spring on the inside, to act as a pressure standard. The other bellows is connected to the inductor system or supercharger outlet. The pressure maintained by the regulator is determined by the position of the needle valve, which is set by a knurled adjusting screw and a wing nut. A very slight change in the regulated pressure allows the evacuated bellows to expand or contract, moving the needle valve, and changing the oil pressure against the servo-piston, which immediately moves to correct the regulated pressure. The control unit does not hunt, and an even pressure can be maintained regardless of altitude.

The regulator may be located wherever convenient, on the engine, supercharger, or airplane. The weight of the complete supercharger regulator is four pounds and four ounces.



Bendix metallic hose, showing its internal construction, connections and protective covering of braided copper wire

# THE DAY BIPLANE

Used Successfully on  
a Tour of the World

By  
Charles Healy Day



WHEN originally designed, the airplane which Mrs. Day and I used on our recent tour of the world was intended only for experimental purposes. The design was the outcome of an effort to produce an airplane which could be safely used for air touring by the ordinary individual of limited experience. Before the airplane was completed, however, we decided that, inasmuch as we considered the ship well suited to the purpose, we might use it to take an aerial vacation. The suggestion that we make a trip around the United States did not appeal to Mrs. Day as very exciting, but her proposal that we make a world tour fell upon receptive ears.

The writer has long contended that the sale of airplanes to private owners has been largely limited to individuals who purchase the airplane as a sporting venture and that many persons who could well afford to purchase an airplane and use it to advantage are held back by the feeling that the airplane is not a safe vehicle to use for touring purposes.

Before the design of our plane was started, an analysis was made of what were considered to be the requirements for a safe airplane. Assuming that the majority of accidents were due to errors in judgment and lack of experience, considerable experimental flying was done to determine what mistakes were most likely to be made and how they might be prevented. Consideration was given to comfort and how cross-country flying might be made less boring, but no effort was

spent in dealing with the ability of the airplane to accomplish aerobatics.

The result was a relatively large surfaced, two-place biplane with side-by-side seating; abnormally large stagger; landing gear with a maximum tread of eight feet—Aerol shock absorbers with a travel of nearly ten inches, located far forward of the center of gravity; large control surfaces, with horizontal tail surfaces raised twenty-eight inches above the center of thrust and having a span of eleven feet; inset ailerons on the lower wing only, having a span of eleven feet nine inches; and seats so located as to give direct downward as well as forward vision, without the upper wing blocking the vision on banked turns.

The powerplant selected was a Martin model D-333, an inverted type four cylinder, air-cooled, equipped with Champion spark plugs. This engine delivers 120 horsepower at 2100 r.p.m. and drives an eight foot propeller. The airplane was equipped with Goodrich low pressure tires, mounted on Aircraft Products wheels, with brakes operated by hand levers between the seats. A horizontal stabilizer control wheel was provided on the left side of the cockpit. The instrument board mounted Elgin instruments consisting of a compass, altimeter, air speed indicator, ball bank indicator, tachometer, oil pressure gauge, oil temperature gauge and clock.

A gravity fuel tank with a capacity of twenty-four gallons was mounted under the front cowling and provided with a glass gauge on the instrument board. For

accurate reading of the gauge, a longitudinal inclinometer was provided and the gauge marked for level flight. After it was decided to use the plane for a world tour, a twenty-four gallon reserve tank was installed under the baggage compartment back of the seat and a wobble pump provided to replenish the gravity tank. Also, the original baggage compartment in the fuselage fairing, back of the seat, which was twelve inches by twenty inches by thirty-six inches, was augmented by a small auxiliary baggage compartment back of the fire wall. The three-gallon oil tank attached to the motor mount in front of the fire wall was replaced with a five gallon tank.

Test flights showed that no changes were necessary in the general design and that the performance was well up to expectations. The airplane would not involuntarily spin or stall and had unusual landing characteristics. Ailerons and rudder were effective in stalled flight and safe turns could be made with the control stick all the way back. Stalling of the horizontal tail surfaces was prevented by the large moment created by the downwash on the lower wing and this problem ceased to be an item of consideration. It could be flown continuously with right and left banked turns and a compass course easily followed with the feet off the rudder pedals. This ability to fly without rudder may appear to be a minor item, but on consideration of the fact that the great majority of accidents when flying blind are due to wrong use of

*(Continued on following page)*



Mr. and Mrs. Day before their start, and a side view of the Day plane at the completion of the world flight

January 11, 1932

Mr. Gordon C. Gillies, Mgr.  
Aircraft Instrument Division  
Elgin National Watch Company  
Elgin, Illinois

Dear Mr. Gillies:

You will no doubt be interested in knowing briefly of the part played by Elgin instruments in the Tour of the World which Mrs. Day and I recently completed in our Day Airplane.

Elgin instruments used included:

- |                     |                       |
|---------------------|-----------------------|
| Compass             | Tachometer            |
| Altimeter           | Oil Pressure Gauge    |
| Air Speed Indicator | Oil Temperature Gauge |
| Ball Bank Indicator | Clock                 |

During the tour we visited seventy-four cities and towns in Europe, Asia and the United States over a period of seven months. To fly in all kinds of weather including the intense heat of the Syrian Desert and the terrific monsoon rains of South East Asia. In spite of the fact that the airplane was exposed, unprotected, to these climatic conditions for days and weeks the instruments proved entirely satisfactory.

In view of the climatic conditions encountered both in the air and on the ground, I consider our flight an exceptionally severe test for the instruments, and the fact that they came through in perfect shape certainly speaks well for their accuracy and durability.

Yours very truly

*Charles Healey Day*  
Charles H. Day



Mr. and Mrs. Charles H. Day and the plane in which they completed the first world tour in an American built light plane. ....

“the Syrian Desert . . .”  
“the Monsoon rains . . .”

NEITHER of these extreme climatic conditions encountered by Mr. and Mrs. Day on their World Tour held any terrors for the Elgin instruments on the dash.

You probably never will meet such conditions; but it is a satisfaction to know that you have a set of instruments which are built to withstand the worst conditions you will ever find.

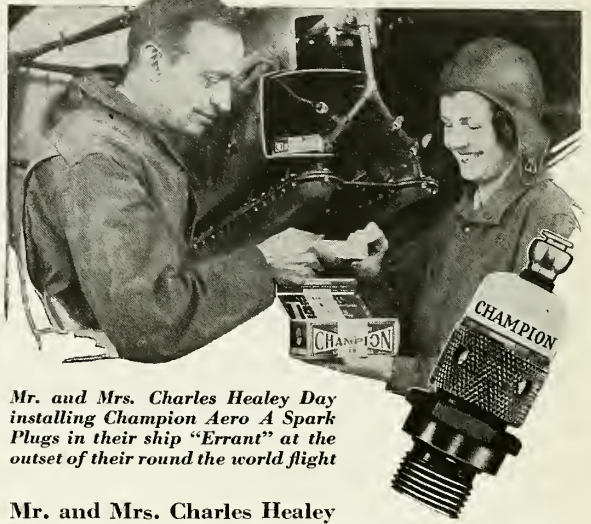
ELGIN NATIONAL WATCH CO.

Aircraft Instrument Division  
ELGIN, ILLINOIS

NEW YORK OFFICE: 20 WEST 47th STREET



# Champion Spark Plugs go round the world without being touched



Mr. and Mrs. Charles Healey Day installing Champion Aero A Spark Plugs in their ship "Errant" at the outset of their round the world flight

Mr. and Mrs. Charles Healey Day recently completed a remarkable round the world flight in their Day plane "Errant," designed and manufactured by Mr. Day, in which the Champion Aero A Spark Plugs which were installed at the start were still untouched at the finish.

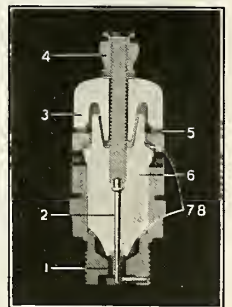
In Mrs. Day's words, "In all this time, flying through all sorts of weather including blazing sun, terrific rain and treacherous monsoon winds, landing forty-nine times in nineteen countries, we never once cleaned our Champion Spark Plugs, and never once during the entire trip did our motor misfire."

As on the round the world flight of Hugh Herndon and Clyde Pangborn, the flight of Mr. and Mrs. Day's "Errant" clearly demonstrates that Champion Spark Plugs are Champions in name and in fact.

The unique dual insulators of Champion Aero Spark Plugs are so designed that they cannot be broken in such a way as to interfere with engine operation. Moreover being exclusive Champion Sillimanite — not porcelain — Champion aero types provide maximum safety and dependability.

### Champion Aero A Exclusive Features

- 1. Restricted bore.
- 2. Special analysis electrode.
- 3. Secondary sillimanite dome insulator.
- 4. Welded steel terminal.
- 5. Gasket seal.
- 6. Primary sillimanite insulator.
- 7-8. Molded Copper gasket seals.



## New Improved Champion

Spark Plugs for Aviation  
Toledo, Ohio Windsor, Ont.

(Continued from preceding page)

the rudder, it takes on great importance. On our recent tour we always abandoned the rudder when inadvertently running into blind weather and although without appreciable previous experience, found it relatively easy to keep our course for long periods of time by using only the original instruments.

After thorough testing, the wings were removed and the airplane shipped to Heston Airport, near London; there, a British periodic compass was installed under the windshield at the extreme right of the cockpit. Eighteen pounds of spare parts for the engine were stowed away in the front baggage compartment; these consisted of an extra connecting rod, complete valves, a piston with rings, extra piston rings, spark plugs, etc.

From London the airplane was flown to Shanghai, by way of Central Europe, the Balkan states, Asia Minor and south-eastern Asia, then shipped to San Francisco and flown over the southern route to New York. The tour included a visit to seventy-four cities and towns and twenty countries, over a period of about seven months. Landings were made on fields in every conceivable condition and included a potato field in Germany, and in Asia, landings in mud so deep that the plane could not be towed out but had to be lifted and carried out by natives. We flew through intense heat over the Syrian Desert and in the midst of the monsoons of south-eastern Asia, where hours of driving rain and squalls were encountered. Take-offs were made when the wide-open engine would not budge the ship and the help of natives was required to start it rolling. The only damage to the airplane throughout the trip was a bent tailskid mount caused by ground-looping across a five-foot ditch over a rice paddy bund and into a rice field, in Foo-Chow, China.

Altogether about 24,000 miles were covered, of which 16,000 miles were by

air. The fuel consumption for the entire trip averaged slightly less than six gallons per hour.

#### Specifications

Wing span .....	34 feet
Wing chord .....	54 inches
Gap .....	60 inches
Stagger .....	54 inches
Length over all .....	24 feet 9 inches
Dihedral, both wings .....	3 degrees
Airfoil .....	Goettingen 593
Wing area .....	275 square feet
Stabilizer area .....	18.3 square feet
Elevator area .....	15.1 square feet
Fin area .....	4 square feet
Rudder area .....	10 square feet
Weight empty .....	1300 pounds
Weight loaded .....	2000 pounds
Maximum speed .....	105 miles per hour
Cruising speed .....	85 miles per hour

## New Stinson De Luxe Model R Cabin Plane

A NEW de luxe model R four-passenger cabin monoplane powered by a 215-h.p. Lycoming engine has been added to the 1932 line of the Stinson Aircraft Corporation of Wayne, Michigan. The new model is now in production and deliveries are being made. The new and completely streamlined design of the plane is said to give an increased cruising speed of ten to twelve miles per hour and a faster rate of climb.

Externally, the model R differs from previous Stinson planes through the addition of a small lower wing stub which

houses and streamlines the landing-gear members and decreases the resistance. All exterior lines have been restyled, wing tips have been rounded to give a more pleasing appearance, and a new Vee-type windshield has been designed for increased vision.

Particular attention has been paid to the comfort of the passengers. The cabin has been increased in size, being 3 inches wider and 4 inches deeper. All seats are wider with deeper cushions, and their angle changed to afford a more restful position. Balsam wood is used to insulate the cabin and to deaden sound. Safety glass windows may be raised and lowered, and a new type of ventilator has been installed. Cabin heaters are also provided for winter flying. Wider, unobstructed doors and a double step have been added.

A feature of the pilot's compartment is a new walnut finished instrument panel indirectly lighted. All metal parts of the controls and engine exhaust stacks have been chromium plated. Pilot seats are adjustable, fore and aft and up and down, and the aisle way between the pilot seats has been widened. Dual wheel controls, adjustable stabilizer and parking brakes are also provided.

The following are standard equipment on the model R: 215-h.p. Lycoming engine mounted on rubber, Eclipse electric starter, Hamilton standard adjustable metal propeller, speed ring cowl on engine, Pioneer instruments, semi air wheels with Timken roller bearings and self-energizing brakes, wheel pants or fender-type pants optional, full air-wheel tail wheel equipped with pants, hydraulic and spring shock absorbers, 12-volt aircraft storage battery, navigation lights, piano exterior finish in new colors, and a metal wing rib. Other Stinson planes for 1932 include the model S four-passenger cabin monoplane with 215-h.p. Lycoming engine and the Stinson trimotored airliner.



Cabin arrangement and new type landing gear of the new Stinson cabin monoplane shown on this month's cover of Aero Digest



# DALLAS AVIATION SCHOOL AND AIR COLLEGE

## Love Field, Dallas, Texas

# WHY PAY MORE ?

When by coming to Dallas you train at a Government Approved Flying and Ground School—one of America's best known and most up-to-date schools—at the following prices. Here you will fly *Fleets—Stinson Jr.—Tri-motored Ford* with all modern Warner, Kinner and Whirlwind motors.

The best flying weather in the country—ideal flying equipment—we train you quicker—better—at less cost.

### Transport Course Now \$2500

200 air hours. Qualifies for Transport License. Tests, 10 hours co-pilot time on Tri-motor Ford; 10 hours night flying; 3000 miles cross country. Complete class room and ship ground course included—no extra charge. 5% cash discount if full amount paid at time of enrollment. Partial payment or deferred plans. \$100.00 part time work if student desires. 20 weeks' Radio Course free.

### Master Mechanics' Course Now \$350

5 months' training in class rooms and shops; servicing, repair and rebuilding aircraft and motors, all types. 10 weeks' Radio Course included free. \$100.00 part time work if student desires. 5% cash discount if full amount is paid at time of enrollment; also partial or deferred payment plans.

### Radio Courses Free

with above courses, or separate Radio courses at reasonable cost.

### Limited Commercial Now \$795

50 air hours. Qualifies for Commercial License. Tests, 3 types ships flown 500 miles cross country trips. Complete class room and ship ground course, no extra charge. 5% discount for cash at time of enrollment, also partial payment or deferred payment plans; part time work for \$50.00 may be had if desired. 10 weeks' Radio Course free.

### Private Pilots' Course Now \$350

20 air hours, qualifying for Private Pilot's License tests: ground course included. No extra charges. Instructions given on a "Fleet." 5% discount for cash if full amount paid.

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from your home to Dallas, when you enroll for Transport or Commercial. Half fare on Private or Master Mechanics' Course.

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# DALLAS

## Aviation School and Air College

### LOVE FIELD, DALLAS, TEXAS

# THE AIR SERVICES

## *Akron Participates in Exercises with Navy Scouting Force*

The *USS Akron* took part in a scouting exercise with the Scouting Force of the Navy during the period January 9 to 11. The exercises consisted of two distinct problems, one a search by the *Akron* for destroyers of the Scouting Forces, which left Charleston on January 9, and the other, a search for the destroyers by cruisers of the Scouting Force which left Hampton Roads, Va., on the same date. Both the *Akron* and the cruisers made contact with the destroyers about 500 miles off the eastern coast of Florida, and were radioed a "well done" by Vice-Admiral Willard, U. S. Navy, Commander Scouting Force, in charge of the exercise.

The flight of the *Akron* in this exercise marked her first active work with a major unit of the U. S. Fleet. During the flight it was impossible to find temperatures above freezing, as the ceiling of the ship was limited, and difficulty was experienced with a 6-inch ice formation on the elevators as well as all over the top of the ship.

## *ZRS-5 Delivery Date Scheduled*

ACCORDING to contract terms, the airship ZRS-5, sister ship of the *USS Akron*, is scheduled for completion January 21, 1933, Rear-Admiral Moffett, Chief of the Bureau of Aeronautics, U. S. Navy, has announced in view of the conflicting reports as to the estimated date. The contract under which the ZRS-5 is being built provides for completion fifteen months after delivery and preliminary acceptance of the *USS Akron*. The latter was preliminarily accepted on October 21 of last year.

## *New Assistant Air Corps Chief*

BRIGADIER-GENERAL OSCAR WESTOVER, the new Assistant Chief of the Army Air Corps, was born at West Bay City, Michigan, on July 23, 1883. Completing high school, he entered the Army as an enlisted man in the Engineers and later received an appointment to the Military Academy from which he was graduated in 1906 as Second Lieutenant in the Infantry. He was transferred to the Signal Corps as Major in 1917, served in an executive capacity in the Bureau of Aircraft Production during the war, and in 1919 became an executive in the Air Corps. After studying at the Ross Field Balloon School, as well as the airship school, he was a winner of the National Elimination Free

Balloon Race at Milwaukee in 1922 and Army entrant in the International Balloon Race at Geneva.

General Westover has served since as Director of Air Corps Production, Commanding Officer of Langley Field, and Commandant of the Air Corps Tactical School. As Assistant Chief of the Air Corps he succeeds Major-General Foulois, who vacated that position to become Chief of the Air Corps.

## *Four Marine Corps Officers Receive Distinguished Flying Cross*

THE Secretary of the Navy has awarded the Distinguished Flying Cross to four officers of the U. S. Marine Corps, members of a two-plane patrol, for participation in an aerial attack on a large group of bandits led by Sandino in Jinotega province, Nicaragua, on June 19, 1930. The officers receiving the Distinguished Flying Crosses are: Captain Byron F. Johnson, First Lieutenants Charles L. Fiske, John N. Hart, and John S. E. Young.

The aerial attack occurred when the two-plane patrol encountered a hostile group of bandits, variously estimated at two hundred to six hundred, on Saraguasa Mountain. The planes attacked with bombs and machine-gun fire and, although one plane was struck by six bullets, the unit continued to fly and attack until ammunition was exhausted. Captain Johnson returned later in the day with a six-plane patrol and renewed the attack.

## *Naval Reserve Progress*

DURING the past year, U. S. Naval Reserve aviation has made the greatest improvement and progress in any single year since its reorganization in 1923. Training activities during the year were conducted at all bases, and over 26,000 hours were flown without fatality to members on inactive duty. In addition to that number of flight hours, members of the Reserve under instruction at the Naval Air Station, Pensacola, accumulated over 20,000 hours while training for qualification and designation as Naval Aviators.

During the year, Marine Corps Reserve Aviation Squadrons have been organized at certain of the Naval Reserve aviation bases and have used the same equipment as the Naval Reserve Aviation Squadrons. Sixty members of the Naval Reserve and nineteen members of the Marine Corps Reserve are at present under training at Pensacola.

## *Coast Guard Flying Boats for Transporting Small Ship Crews Ordered*

THE FIRST OF a fleet of five flying boats for the Coast Guard service, which will be capable of picking up and transporting the whole crew of small vessels, is expected to be ready for testing late in February. The new ships will be equipped with radio and will be able to travel 500 miles over the ocean and back, as they will have a cruising radius of 1,000 miles. It is estimated that one of the planes will be capable of surveying 25,000 square miles of land and water and that the combined fleet will be able to watch over 125,000 square miles of land and water.

## *Sunnyvale Airship Base Bids Opened*

DATES for the opening of bids for the construction of three projects at the U. S. Navy's new lighter-than-air base at Sunnyvale, Calif., are announced as follows: Bids for construction of a 2,000,000-cubic foot capacity gas holder and a 200,000-gallon elevated water tank were to be opened in the Navy Department on January 27; bids for the construction of the helium and boilerplant building will be opened on February 3 and bids for the administration building, dispensary and barracks will be opened on February 17.

The 2,000,000-cubic foot low-pressure gas holder for storing helium will be the largest helium holder in the world and is to be of the four-lift telescopic type, approximately 150 feet in diameter and 175 feet high. Bids opened on February 3 will be for the helium repurification building, the foundations of the 2,000,000-cubic foot helium holder, a helium high-pressure storage drum of 1,000,000-cubic foot capacity, and a long piping tunnel to the hangar.

## *Radio Tests in Flying Laboratory*

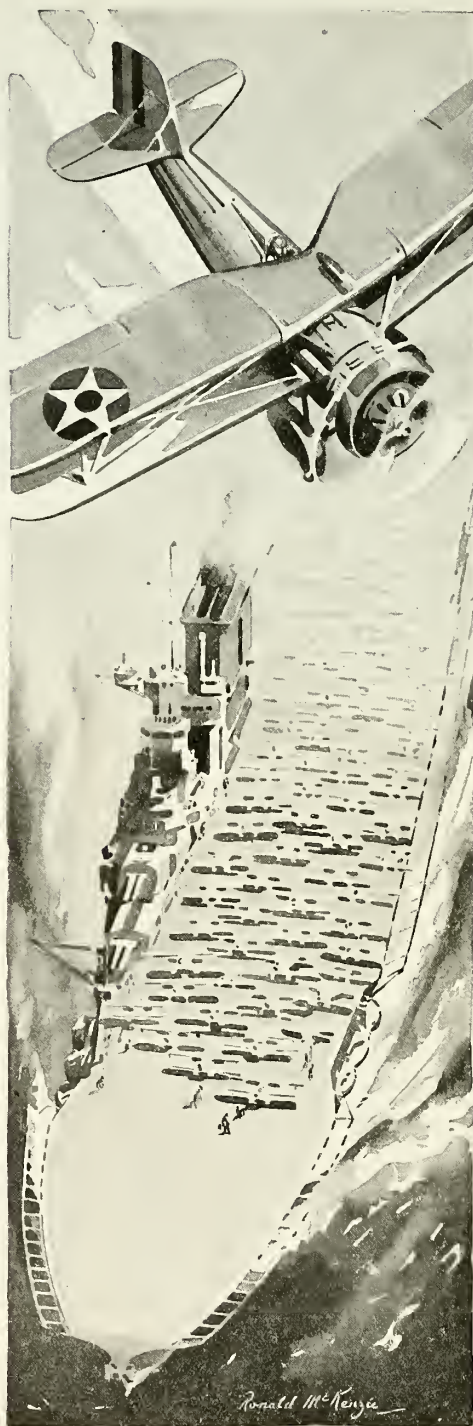
THE Ford tri-motored airplane, which is equipped as a flying radio laboratory, recently left its home base at Wright Field, Dayton, Ohio, to spend a few days at Selfridge Field, Mich., in connection with the testing of Western Electric command sets. These sets, installed in airplanes of the First Pursuit Group, had been reworked at Wright Field. Much valuable information was obtained by the pilots of the Group flying planes equipped with the sets, and they were aided in their tests by the personnel of the flying laboratory.

(Continued on following page)



## *Flying from Floating Fields*

Think of a plane that can accelerate from rest to flying speed in a short run on deck. Picture a speed range extending from the fast work of observation to relatively slow deck landing. Consider the structural strength needed for coming in continually on steel and being stopped by arresting gear. Add to those specifications easy handling, flashing performance and intrinsic reliability and you have the Chance Vought Corsair. Chance Vought Corporation, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation.



**CHANCE VOUGHT  
CORPORATION**



(Continued from preceding page)

#### **Training Started at Randolph Field**

ON November 2, 331 students started training at Randolph Field, Texas. Of this number, 113 began training on the basic stage, having been transferred from March Field, Calif., and Brooks Field, Texas. Entering the primary class were 218 students, including seven holdovers. Eight students were eliminated for physical disqualifications.

#### **Two-Place Glider Tested at Luke Field**

THE first flight test of the two-place glider constructed at Luke Field, T. H., resulted in a broken wing skid and a cracked tail skid, due to a sudden change in wind direction while it was being towed off. Lieut. Joseph B. Stanley, who with Lieut. Tallmadge L. Boyd and Lieut. James M. Thompson, has worked for months on the construction of this revolutionary glider, said that the craft handled well. Plans are being made to establish a camp on windward Oahu to seek an endurance record.

The glider has a wing span greater than that of the Luke Field Keystone bombers, which are the largest airplanes at the Army flying fields.

AT Nuanu Pali, Hawaiian Islands, there was established in December, the world's endurance soaring record of 21 hours, 34 minutes and 15 seconds. This mark was made in the first annual Hawaiian Glider Competition, and the pilot was an Army flier, Lieut. William A. Cocks, Jr. Cocks' feat of motorless flying, extending through all of one afternoon, that night and the following morning, broke three other records in addition to the world mark for duration. These were the American endurance records (formerly 7½ hours) and both the American and world-wide records for distance over a closed course.

A photograph showing Cocks' glider in flight at the time the record was made is shown on the frontispiece (page 26) of this issue of AERO DIGEST.

#### **Camera Guns for Pursuit Group**

THE First Pursuit Group, Selfridge Field, Mich., has been supplied with twenty camera guns to be used in connection with its tactical training. The guns are the G-3 type, made by the Gaertner Scientific Corporation, and are operated by a trigger fitted on the control stick, the film roll being actuated by a strong spring. A test installation was made on a Boeing P-12 airplane and good results were obtained.

It is anticipated that the use of these camera guns in the tactical work of the First Pursuit Group will result in many enlightening comparisons and will aid greatly in the solution of tactical problems

of attack, formation, and position. Many arguments should be eliminated, or at least settled, for on each exposure of the film there appear a record of the exact time of exposure and a picture of the target ship, if a hit is scored. Especially important will be the use of camera guns in the work the Group will perform in the formative period of two-seater pursuit tactics.

#### **New Barracks for 23rd Squadron**

THE War Department having approved the construction of new barracks for the 23rd Bombardment Squadron at Luke Field, T. H., concrete was poured for the foundations recently, marking the inauguration of a new area to replace the one totally destroyed by fire on June 15. The 13 sets of enlisted men's quarters will represent an innovation in Army housing, each being 16 by 32 feet and accommodating eight men.

#### **Sharp Shooting by Pilots in Hawaii**

A TACTICAL exercise recently was held at Fort Shafter, T. H., involving aerial machine-gun fire and bombing. Ground targets representing a battalion of infantry were scattered in open formation, based on actual dispersion of a battalion when warned of the approach of a hostile airplane. The 26th Attack Squadron of Wheeler Field was designated as the organization to perform the mission. Of a total of 270 targets, 232 were struck, many of them with six or eight bullets each.

#### **Airship Activities at Scott Field**

AIRSHIP flying at Scott Field, Belleville, Ill., has been somewhat restricted lately due to the weather and the fact that only one ship was set up. Plans to increase the number of ships in commission will take effect later in the winter with the setting up of an E-type bag to which will be suspended an enclosed cabin attached by internal suspension. The ship will be powered by two 70-h.p. Lambert engines, and will have a capacity of about 90,000 cubic feet, less than half the size of the TC type now in use. After the set-up of this ship has been completed, an A-type airship will be put together which will have a capacity of about 135,000 cubic feet and is expected to be in commission about May.

#### **Observation Group at Brooks Field**

AFTER the U. S. Army Air Corps Primary Flying School had departed for its new station at Randolph Field, with many officers and enlisted and civilian personnel, the 12th Observation Group took up their quarters at Brooks Field, the first tactical organization to be sta-

tioned in San Antonio since the war. Major Frank D. Lackland, who was commanding Dodd Field, took over the command of Brooks.

The Field now includes the 22nd Observation Squadron, formerly of Maxwell Field, the 12th Observation Squadron, 12th Observation Group Headquarters and First Photo Section, formerly of Dodd Field, the 88th Observation Squadron from Post Field, Fort Sill, Okla., the 58th Service and 62nd Service Squadrons, formerly with the Air Corps Primary Flying School, and retained at the Field when it became a station for the Tactical Group, besides detachments of the Quartermaster, Signal, Medical and Ordnance Corps, numbering 870 enlisted men and approximately 75 officers.

#### **Retractable Landing Gear Tested**

A STUDY is being made at the Materiel Division, Wright Field, of retractable landing gear to determine the best retracting mechanism for low- and high-wing monoplanes. A consideration of stainless steel and cantilever landing gears applied to both monocoque and frame structures, a comparison of weights, and an estimate of performance change are included.

#### **Releasing Device for Giant Chute**

MAJOR E. L. HOFFMAN, in charge of the Parachute Branch, Materiel Division, Wright Field, reports the development of a quick releasing device by which, when he is running drop tests on the 80-foot triangular parachute with weight, the weight upon striking the ground automatically releases the parachute which collapses immediately without dragging. Since the fabric of the 80-foot chute is liable to injury in being dragged, and since any mere man or group of men who tried to stop it by catching at the shroud lines were liable to injury also, some such device was considered highly necessary.

The device is a simple pole arrangement which extends through the bottom of the weight, and upon striking the ground is pushed up through the weight, releasing a pin which holds the parachute. In a former test, Major Hoffman and his automobile had to be untangled from the shroud lines of the giant chute as from a web.

In the last test, the parachute, greatly strengthened in design, withstood a drop with a 1400-pound weight suspended, for the first time without the slightest evidence of failure. Further tests are planned in which a delayed opening with the 1400-pound weight will be made. This will produce the greatest shock ever attempted on any parachute known.

# AERONAUTICAL INDUSTRY

## *F. W. Neilson, New Sikorsky President*

FREDERICK W. Neilson has been elected president of the Sikorsky Aviation Corporation, Bridgeport, Conn., according to an announcement made recently at the office of United Aircraft and Transport Corporation, New York, of which the company is a subsidiary. He succeeds E. E. Wilson, who is now president of the Chance Vought Corporation, another subsidiary.

Mr. Neilson was graduated from the U. S. Naval Academy in 1917 and served during the war with the Atlantic Fleet. At the expiration of the War he undertook training at Pensacola, and later was assigned to duty in the Bureau of Aeronautics, Navy Department. During this period he served on the American delegation to the International Conference for regulation of aerial warfare at the Hague. After service at sea with a torpedo bombing plane squadron, and in the Navy Department, Neilson commanded Fighting Plane Squadron 2 with the Carrier Langley, from which office he resigned in 1930 to become sales manager and later vice-president of the Sikorsky Aviation Corporation.

## *Aeronautics Branch Compiles Questions for Mechanic's License Examinations*

ONE hundred and fifty questions which indicate the general scope of the required written examinations for airplane and engine mechanic's license have been compiled by the Aeronautics Branch of the Department of Commerce to serve as a guide for candidates for such licenses. The questions show that the requirements for a license call for a full knowledge of the repair and maintenance of airplanes or engines, according to the type of license applied for, and of those portions of the Air Commerce Regulations which relate to a licensed mechanic's work.

## *Airworthiness Requirements*

THE NEW AERONAUTICS Bulletin No. 7-A, entitled "Airworthiness Requirements of Air Commerce Regulations for Aircraft," has recently been published by the Aeronautics Branch of the Department of Commerce. It gives the changes in the engineering requirements to be met by aircraft in order to be certified as airworthy by the Department, a few of which are as follows: In the case of retractable landing gear, it is now required that an indicator be installed which will show clearly at all times the position of the wheels and which will be visible from the pilot's cockpit. Retractable landing

gear of single-engined landplanes should be so designed that it may be fully lowered in sixty seconds or less. A change as to the number of exits to be provided is contained in the requirements and these vary according to the number of passengers carried and size of plane. In flying boats of 5,000 pounds gross weight, or more, water-tight compartments are required to be arranged so that, with any two adjacent compartments flooded, the hull and wing-tip floats will retain sufficient buoyancy to support the gross weight of the aircraft.

## *Hawks and Jernigin Teamed Again on Transport Survey*

CAPTAIN FRANK M. HAWKS and J. D. (Duke) Jernigin, pilots on the first transcontinental glider flight, have taken to the cross-country trail together again, this time in fast planes in which they are leading a survey party over the network of Transcontinental & Western Air, Inc. The tour included seven pilots and six planes of The Texas Company and will require more than three weeks for stops in twenty cities along a route of almost 10,000 miles.

## *Western Electric Radios on Many Planes*

CONTINUED growth of air transportation in the United States during 1931, accompanied by the extension of airways and the improvement of facilities, has been reflected in the number of communication systems furnished to the major transport lines by the Western Electric Company. Twenty-three ground stations and 100 transport planes were equipped with receiving and sending units, while long-wave receivers for picking up radio beacons and Government weather broadcasts were furnished for 100 planes.

Altogether, 250 transport planes have been equipped for two-way conversation between pilot and ground. During the year, these flying telephone systems were actually flown more than 2,700,000 miles a month in the regular commercial service. A total of 100 ground stations, located along the transcontinental routes, form a privately-operated radiophone network that gives service to pilots over more than 20,000 miles of airways. A public address system of special power was installed at the Wayne County Airport, Mich., in which seven amplifiers are used to speak to planes anywhere on the field, which is a mile square.

As a result of cooperation with the manufacturers of airplanes, it will be possible to buy planes already equipped for radiophone service instead of adding the equipment to the finished plane. Accommodations for the apparatus will be incorporated in the structural design and its weight will be absorbed without affecting stability.

During the year a modified form of the transport plane radiophone was designed by Bell Telephone Laboratories to suit the needs of the private flier. This set consists of a long-wave receiver and a short-wave transmitter and enables the private flier to carry on two-way conversation with suitably equipped airports, as well as to receive Government broadcasts.

## *Patent Exposition*

TOUCHING EVERY field of science and industry, inventors from every state in the Union, and from many foreign countries, will display their creative efforts at the Third International Patent Exposition to be held in the new convention hall at Philadelphia, Pa., from February 1 to 10. Major-General George O. Squier, a noted inventor himself, will be the honorary chairman of the exposition.

## COMING AERONAUTICAL EVENTS

February 1 to 10. Third International Patent Exposition in new Convention Hall at Philadelphia, Pa.

February 19. British non-stop flight from England to Capetown for long-distance record.

February 23. A meeting under the auspices of the Daniel Guggenheim Fund Committee on elementary and secondary aeronautical education. 2:15 p. m., at the Hotel Washington, Washington, D. C.

March 14-20. Northwest Aircraft Show, St. Paul.

April 2-10. National Aircraft Show of 1932, sponsored by the Aeronautical Chamber of Commerce of America, Inc., City Airport, Detroit, Mich.

November. The thirteenth aeronautical exhibition, organized by the Syndical Chamber, will be held at the Grand Palais, Paris.

### *Aviation Mechanic's School Opened By Curtiss-Wright*

JOHN S. ALLARD, president of the Curtiss-Wright Flying Service, has announced the selection of Hadley Field to inaugurate a new school for aviation mechanics which will serve the New Jersey

district. The course to be given lasts for four months and includes elementary and advanced training. The four months period counts toward the one year of experience required by the Department of Commerce, Aeronautics Branch, for an aviation mechanic's license.

### *Thompson Aeronautical Corporation Moves Offices to Detroit*

THOMPSON Aeronautical Corporation and its air-transport subsidiary, Transamerican Airlines Corporation, will move its general air-transport, sales and service offices from Cleveland to Detroit on March 1, according to an announcement from R. C. Marshall, president of that organization. The corporation's traffic headquarters have been located in Detroit for two years and the operations base was moved there recently.

The City of Detroit's engineering department has begun construction on the corporation's new offices, which are to occupy 3,000 additional square feet of the Detroit Municipal Airport hangar and administration building, the scene of the forthcoming National Aircraft Show. Further construction on the corporation's second Detroit airport hangar has been started.

## DIGEST OF RECENT EVENTS

*A Brief Chronological Summary of the Month's Important Aeronautical News*

### *Record Breaking Glider Flight*

AT A GLIDER competition held in Hawaii, Lieut. William A. Cocks, Jr., broke four records in one flight when he kept his motorless plane aloft for 21 hours, 34 minutes, and 15 seconds, and was allowed a total of 376 miles over a closed course. This flight breaks both the national and international endurance records as well as the United States and world marks for distance. (December.)

### *Miami Air Races*

THE FOURTH Annual All-American Air Meet was held at the Miami Municipal Airport, Miami, Florida. In addition to the Glenn Curtiss, Jr., Trophy race and other speed events, military maneuvers by aircraft of the U. S. Army Air Corps, Navy and Marine Corps were featured. The Meet was immediately preceded by the New York to Miami Amateur Cruising Race under the auspices of the United States Amateur Pilots Association. At the close of the Meet, the Florida State Air Tour began its ten-day tour of the state. (Jan. 7-9.)

### *Akron on Scouting Expedition*

THE AKRON participated in her first active work with a major unit of the U. S. Fleet when she assisted in a search for destroyers of the Scouting Fleet. The Akron, with cruisers of the Scouting Force, made contact with the destroyers about 500 miles off the eastern coast of Florida. (Jan. 9-11.)

### *Air Corps Chiefs Honored*

MAJOR-GENERAL FECHET and Major-General Foulouis, the retiring and incoming chiefs of the U. S. Army Air Corps, were given a dinner at the Washington Hotel, Washington, D. C., at which many men prominent in the aeronautical world were present. (Jan. 11.)

### *Record for Radio Communication*

A WORLD'S RECORD for unbroken basal communication was claimed by Capt. W. R. Taylor and Lieut. E. Wilson, U. S. Army Air Corps, after their arrival at Lake Placid, N. Y., from Mitchel Field. They were in constant communication with Mitchel Field until the plane was within fourteen miles of Lake Placid and 262 miles from their base. (Jan. 11.)

### *Dayton to Washington in 86 Minutes*

FLYING IN bitter cold, five miles high, on the wings of a seventy-mile wind, Capt. Reuben C. Moffat, U. S. Army Air Corps, flew from Wright Field, Dayton, Ohio, to Bolling Field in eighty-six minutes at an average speed of 266 miles per hour. Captain Moffat had to take oxygen from a tank throughout the flight which was made to test the power plant of a new Curtiss P-6D Army pursuit plane. (Jan. 18.)

### *DO-X III Is Launched*

(Germany.) A new Dornier flying boat, the DO-X III, sister ship of the craft that flew the South Atlantic and is now in this country, was launched on Lake Constance where it will be tested for delivery to an Italian concern. (Jan. 19.)

### *London-Capetown Service*

(England.) The first regular air mail from Croydon Airdrome departed for Capetown, South Africa, in one of a new fleet of 38-passenger "Heracles" airliners. The plane is due at Capetown on January 31. (Jan. 20.)

### *Altitude Record in Diesel-Powered Plane*

FLYING THE SAME Diesel-powered plane in which he recently made a trip from Detroit to Brooklyn at an expense of only \$4,00, Clarence Chamberlin established a new altitude record for planes of this type when he climbed to a height of 22,000 feet. The rate of climb curve on the barograph chart was constant and other novel details of flight were observed during the flight. (Jan. 24.)

### *Distinguished Flying Cross Award*

THE Distinguished Flying Cross was presented to Captain Byron F. Johnson, U. S. Marine Corps, Commanding, at Brown Field, Quantico, Va., by Brigadier-General John H. Russell, U. S. Marine Corps, Commanding General Marine Corps Base, with military ceremony. The Cross which also was awarded to Lieutenants Charles L. Fiske, John N. Hart, and John S. E. Young, was for participation in an aerial attack in Nicaragua. (Jan. 30.)

### *New Davis Airplane*

A NEW MONOPLANE, the D1-W, powered by a Warner "Scarab" engine, has been announced by the Davis Aircraft Corporation of Richmond, Indiana. The plane is equipped with Townend ring, racing-type tunnel wind shield with front cockpit cover, wheel pants, Aircraft Products semi-balloon wheels, equipped with brakes, Aerol shock struts, compass, tachometer, altimeter and oil temperature and pressure gauges. The performance data is as follows:

High Speed.....	140 miles per hour
Landing speed.....	40 miles per hour
Cruising speed.....	115 miles per hour
Climb.....	1,200 feet per minute
Service ceiling.....	14,000 feet
Gasoline capacity.....	30 gallons

### *New Flivver Airplane With Two-Cycle Engine Tested*

TEST flights of the new flivver airplane designed by engineers of the Herren Aeronautical Corporation, Barrington, Ill., have been started at Sky Harbor Airport. Major R. W. Schroeder, who assisted in designing the airplane and engine, witnessed the flights and said that they proved the two-cycle engine finally has been adapted for use on aircraft. Automobile gasoline was used in place of aviation gasoline. The engine is a four-cylinder 58-h.p. radial air-cooled type and has no valves, the pistons performing the functions of valves. The engine is supercharged and the propeller geared. The airplane is a two-place tandem open biplane with a 24-foot wing span and is 19 feet 6 inches overall in length. Its cruising speed is estimated at 85 miles per hour, and its top speed at 100 miles per hour.

### **Dr. R. F. Longacre Becomes Medical Director of Aeronautics Branch**

DR. HAROLD J. COOPER has resigned from the post of Medical Director of the Aeronautics Branch, Department of Commerce, and has been succeeded by Dr. R. F. Longacre, former Assistant Chief of the Medical Division, U. S. Army Air Corps, it has been announced by Gilbert G. Budwig, Director of Air Regulation. Dr. Cooper, who was an aviation medical officer in the National Guard before his appointment as Medical Director, has left the Government service to accept a position as director of medical activities for a commercial concern.

Dr. Longacre, the new Medical Director, was born in Collegeville, Pa., and is a graduate of Ursinus College and of the School of Medicine of the University of Pennsylvania. He practiced medicine in New York City for 22 years prior to his appointment to the Medical Corps of the U. S. Army during the World War.

### **No Unusual Opportunities Open to American Pilots in Chinese Aeronautics**

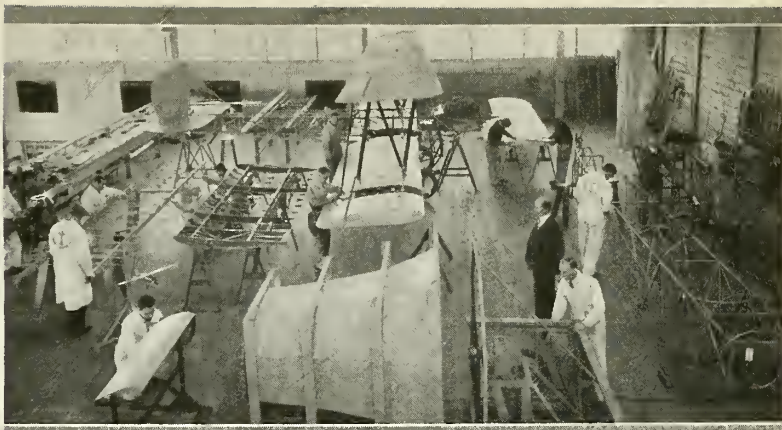
REPORTS REACHING the Department of Commerce indicate there is no unusual demand in China for American airplane pilots, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, has announced. American airmen are advised not to go there with the idea of flying professionally unless they have contracts or other definite assurance that positions are awaiting them. This information is being given to American airmen in view of the fact that several American and Canadian pilots have been reported by the American Commercial Attaché at Shanghai to have gone to China seeking high-salaried positions advertised in posters appearing at airports on the Pacific Coast and in Western Canada. The pilots found that there were no openings for them in any Chinese flying activities.

### **Oldest Pilot Honored**

JAMES W. MONTEE, who is believed to be the oldest pilot in the United States, has recently been elected to life membership, retired, in the Professional Pilots Association, according to a resolution passed by the Board of Governors of that organization. Mr. Montee, who is seventy years of age, operates a commercial flying service at Los Angeles, in association with his three sons who are also professional pilots.

### **Transatlantic Flights to Europe**

TRANSATLANTIC flights planned for the near future include non-stop flights to Poland and England, from America, and from Ireland to New York. Mrs. Susan Budny of Detroit proposes to fly non-stop from Milwaukee to Po-



Students receiving practical training in the shops of the Boeing School of Aeronautics

land, refueling over New York and Paris. Eric R. Gunner, Canadian ace in the World War, has revealed plans for a solo transatlantic flight, having been assured financial backing from England. Capt. J. P. Saul, who navigated the Kingsford-Smith plane across the Atlantic in June, 1930, has announced that preliminary arrangements are being made for a flight from Port Marnock, Ireland, to New York next May. He will be accompanied by Colonel James Fitzmaurice. Ruth Nichols is reported as having selected an open-cockpit Lockheed monoplane for her attempt to span the Atlantic alone.

### **New Orleans 1933 Air Races**

MARDI GRAS week, February 28 to March 4, 1933, has been selected for holding the air races in New Orleans. Sanction has been given by the National Aeronautical Association to stage the Curtiss Marine Trophy Race, which will be made a feature event of the meet, and will be similar to the Thompson Trophy Race in the National Air Races. The program will run for five days and will feature both land and seaplane racing, as this is one of the few places where it is possible to hold seaplane events. Shushan Airport will be dedicated during the week.

### **N. Y. Office for R. Fuess**

AN AMERICAN office has been established at 245 West 55th Street, New York, by R. Fuess, Inc., located at Berlin-Steglitz, Germany, and manufacturers of instruments for scientific research and industrial control. The uses to which these instruments are adapted include: estimation of pressure, temperature, and the humidity of the air; meteorological observations, measurements of velocity, quantity and pressure of air and gases; microscopy, testing of materials and optical observations; estimation of optical constants; and observations of water level, measuring quantities of water, and registering time.

### **Ninety-Nines' Officers and Governors**

AT the January meeting, the following officers and governors were elected by the Ninety-Nines to serve until its next annual meeting at the 1932 National Air Races: Amelia Earhart, president; Louise Thaden, vice-president; Frances Harrell Marsalis, secretary and treasurer. The governors for the eight sections are: New England, Mary L. Sanson, Hartford; New York and New Jersey, Marjorie Lesser, Albany; Middle Eastern, Dorothea Leh, Allentown; Southeastern, Mary Alexander, Lynchburg; North Central, Lauretta Schimmoler, Bucyrus; South Central, Jean La Rene, Dallas; Northwestern, Edith Foltz, Portland; Southwestern, Margaret Perry Cooper, Beverly Hills. The Ninety-Nines is open to women pilots holding active Department of Commerce licenses or licenses from foreign countries.

### **New Nicholas-Beazley Representatives**

THE NICHOLAS-BEAZLEY Airplane Company, Inc., of Marshall, Missouri, has announced the appointment of the following representatives for its NB-8 "Trainer," a two-place high-wing monoplane, and its NB-4 three-place low-wing monoplane: Southern Airplane Service, Inc., 830 Union Street, New Orleans, Louisiana, distributor; Wes Cooksey, Beaumont, Texas, dealer; Reel Air Service, Sanford, Florida, dealers in Volusia, Orange and Seminole Counties, Florida; Otto Ulrichs, Mahwah, New Jersey, North Jersey dealer; Universal Air Services, Floyd Bennett Airport, Long Island, New York, dealer; Kanawha Aircraft Sales and Service Company, Smithers, West Virginia, Southern West Virginia dealers. The appointment of the Raymond Aircraft Company of Lakeland and Jacksonville, Fla., as general distributors for its aircraft in the states of Florida, Georgia and Alabama also has been announced.

### Chamberlin Diesel Altitude Record

COLONEL Clarence D. Chamberlin took off from Floyd Bennett Field, Brooklyn, on January 25, to test the altitude limit of his Lockheed plane powered with a Diesel engine burning furnace oil. As there is no previous altitude record for planes of such power plant, which are considerably heavier than standard aircraft gasoline engines, the maximum height which he reached would be considered the record, he said. He carried a sealed barograph to record officially the altitude limit of his flight.

An hour and five minutes later, after battling winds aloft and temperatures down to 10 degrees below zero, Colonel Chamberlin landed, confident that he had reached a height of better than 20,000 feet, "possibly 23,000 feet." He was unable to give any more accurate report, as the altimeter on his plane froze at between 16,000 and 17,000 feet. The barograph would continue to record his climb regardless of the temperature, but this cannot be opened until it is submitted to officials of the National Aeronautic Association. For a brief period at the top of his climb, Colonel Chamberlin breathed oxygen from a small tank.

### Electrically-Lighted Wall Map to Show Wind Conditions

H. A. GIBBS, Divisional Radio Supervisor of American Airways at Dallas, Texas, has perfected an electrically lighted wall map for radio telephone operators which gives instantly the direction of the wind, the wind velocity and the correct runway to use in making landings. This up-to-the-minute information is transmitted to pilots coming in to land.

As the wind vane on the roof of the administration building swings about it makes electrical contacts which are connected to small lamps located beneath an opaque map of the field. Each runway is numbered and the numbers are shown in their corresponding positions on the map. As the wind shifts, the lamps indicate the runway to be used. An extra lamp placed midfield at the junction point of the runways flashes once per minute for each mile per hour of wind. To determine the velocity of the wind, the flashes are counted for fifteen seconds and the results multiplied by four to give the speed of the prevailing air currents. This information is given to the pilots by radio telephone as they circle the field for landing. Similar installations are planned for all American Airways terminal points.

## NORTHEAST

THERE are at present in Maine twenty active aeronautical corporations, as well as numerous unincorporated organizations. Their activities cover a wide range and include taxi and sight-seeing service, advertising, photography, student instruction, airline operation, and airport development and operation, in which eight companies are engaged.

Construction of a steel hangar is in progress at Godfrey Airport, Bangor, Maine. The building will be 90 by 90 feet and have an overhead clearance of 16 feet.

With fifteen members the Augusta Aero Club, a light-plane flying club, has recently been formed at Augusta, Maine. The group plans to purchase a plane in the spring for instruction purposes.

AT THE Curtiss-Essex Airport, Caldwell, N. J., 2,841 passengers were carried during the last half of 1931 as follows: July 581, August 604, September 427, October 938, November 239, December 52. The small business during December was due to rain and fog on several Sundays. At one time or another during this last half-year 46 students were enrolled for flight instruction. At present there are 12 active students.

R. C. NEWMAN of Union Airways, Inc., Pine Brook Airport, Pine Brook, N. J., announced that 19 active flying students were enrolled at the present time. The company is operating five planes, three New Standards, one Aeromarine Klemm, and one Waco biplane.

THE HYANNIS Glider Club with headquarters at the Cape Cod Airport, Marston Mills, recently completed its first year of existence. Construction of the glider, a primary type, was begun in January and finished in May. Since that time 120 flights have been made. A new license, issued by the Registry of Motor Vehicles, grants permission for auto towing.

STATE POLICE of Troop D, at Oneida, N. Y., covered more miles by airplane during December than by horse, motorcycle, boat and afoot, combined. The State Police Department reported 1,020 miles patrolled by airplane, as against 145 for mounted drivers, 588 by cycles, 126 by foot and 70 by boat, 50,929 by autos and 2,500 by train.

LEO STEVENS, of Cooperstown, N. Y., is experimenting on a new type parachute. He has made 3,400 balloon and airplane flights, and has used parachutes ten times in emergency jumps.

KARL ORT, of York, Pennsylvania, who deals in new and used aircraft and engine parts, supplies and accessories, recently made a large purchase from the Hasbrouck Heights and Paterson, N. J., plants of the General Aviation Mfg. Corp. Mr. Ort bought, for resale: 120,000 feet of 1025 carbon and 4130 chrome moly round and streamlined tubing; 5,000 gross steel, brass and bronze flat- and round-head wood screws; several thousand gross machine screws; 600 gallons pigmented dope, lacquers and Duco.

UTICA, N. Y., records show that total receipts from the operation of the municipal airport for 1931 totaled \$1,809.96, whereas the amount estimated as revenue in the 1931 budget was \$10,000, making a deficit of \$8,190.04. Receipts for 1930 were \$5,472. The receipts include hangar rentals and sales of gasoline and oil.

CONSTRUCTION work has been started on the new clubhouse of the Philadelphia Aviation Country Club at Wings Port, a newly developed airport located near Ambler, Pa. Members of glider clubs and aviation enthusiasts recently gathered there for a meeting held in conjunction with the Aero Club of Pennsylvania. An exposition of glider flying and the methods used in instruction was given.

AMERICAN AIRWAYS has appointed Willard Reed, Jr., of Cleveland, Ohio, as traffic service manager, with headquarters at the Newark Metropolitan Airport. His duties will be to co-ordinate and supervise all passenger handling activities in the Colonial Division. Mr. Reed is a transport pilot and holds a commission in the Marine Corps Reserve.

A LICENSE HAS been issued by the Department of Commerce to J. C. Popper and J. P. Carter of New York, N. Y., to make experimental flights with a rotor plane. Their ship is said to be made from an old fuselage with a motorcycle engine to drive the rotors.

## SOUTHEAST

MORE THAN 10,000 airplanes flew over airways converging in Atlanta, Ga., during 1931, it was disclosed here by the annual report of the airways weather bureau at Candler Field, handled by E. M. Barto, meteorologist. A total of 10,350 detailed reports of flying conditions were furnished scheduled and transient pilots, he stated, and his report shows further that 487,640 weather reports were received during the year, or 1,336 daily.



AMERICAN AIRWAYS, operating from Bowman Field, Louisville, Ky., recently closed a 25-year lease for space on the field, on the basis of rental of \$1,000 per year, and ten per cent of the company's gross receipts for all flying other than transport flight service. All gasoline other than that used in transport service will pay a tax of 1 cent per gallon and oil 5 cents a gallon.

A TOTAL of 231 airplanes used Dale Mabry Airport, Tallahassee, Fla., last year, according to figures given by Ivan Munroe, manager. Profits from the sale of gasoline suitable for aircraft, and from the sale of 232 gallons of oil, netted the city \$1,023 during that period.

THE BETSY ROSS CORPS, national organization for licensed women pilots, assumed supervision of the development of its own airport near Orange Park, Fla., with inspection recently by Mrs. Opal Kunz, the national commander, of a mile square plot donated by Dr. Frances Dickerson, Chicago. The airport has eight runways, four 1,000 feet and four 1,530 feet long by 200 feet wide which will be surfaced with clay. A group of buildings on the property will be renovated and Miss Lillian Perkins, Langhorne, Pa., will be in charge of the airport, the only one in the world owned and controlled by women.

THE MUNICIPAL airport at Quincy, Fla., was dedicated on January 21, with a crowd of about 10,000 people in attendance. The city commissioners expect to start a hangar and other improvements early this spring.

COMMISSIONERS of Miami, Fla., on Jan. 21, authorized the purchase from the Glenn H. Curtiss Properties, Inc., of approximately 1,730 acres in Opa-Locka. This land connects the Miami municipal airport, the United States Naval Aviation Reserve base and a tract of 640 acres purchased several months ago for presentation to the United States Navy for a dirigible mooring mast.

A POSTOFFICE devoted exclusively to air mail will be opened at the Dinner Key, Miami, Fla., base of Pan-American Airways. It will be equipped to handle the 1,500,000 pounds of foreign air mail which passes through the base annually.

MIAMI, FLA., is first among the United States ports of entry in the number of airplanes and airplane passengers arriving from foreign ports during the year ending June 30, 1931, Sidney Brown, Tampa, collector of customs, announced recently. There were 1,480 airplanes and 12,391 passengers arriving at Miami as

compared with 807 airplanes and 3,475 passengers arriving at Brownsville, Texas, the second port of entry. San Diego, Calif., with 535 airplanes and 2,402 passengers was third, and El Paso, Texas, with 315 airplanes and 979 passengers was fourth.

THE CITY OF Birmingham, Ala., has given the Alabama National Guard, 106th Observation Squadron, permission to use part of the municipal airport. The city is planning to deed approximately 12 acres adjoining the airport for hangars, officers' quarters and other buildings.

IMPROVEMENTS made at the Auburn-Opelika, Ala., Airport included all night lighting from sundown to sun up each night. The lights will be in operation beginning February 1 and formal opening of the airport is scheduled for some time in April.

TWENTY STUDENTS have enrolled in the aviation course established at McDonough School, Pikesville, Md. The object, of course, is to make students with an inclination toward aviation familiar with the nomenclature and more intimate details of an airplane's construction, according to Louis A. Lamborn, headmaster. A ground school in aeromechanics has been established which includes the building of an airplane.

THE ANNAPOLIS, Md., Airport Terminals has been created for the purpose of stimulating interest in and promoting aviation. It is planned to capitalize at \$50,000 and to select an airport terminal site on the Severn River. Walter H. Hart has been elected temporary chairman. Capt. Simon S. Martin, secretary, and William A. Strohm, treasurer.

CLARENCE H. SCHILDHAUER, well known pilot and particularly known as the co-pilot on the DO-X, the world's largest flying boat, has joined the staff of the General Aviation Manufacturing Corporation, airplane manufacturers of Baltimore, Md.

COL. A. S. BOYERS, member of the Kentucky State Air Board, has been granted the exclusive sales agency for Aeronca airplanes in Kentucky. He has established sales offices at Boyers Airport, Inc., at Melbourne, Ky., of which he is the president and general manager.

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## NORTH CENTRAL

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OVERNIGHT PACKAGE delivery from New York to Milwaukee, St. Paul and the northwest, has been announced by

the United States Packing & Shipping Company and the Kohler Aviation Corporation which operates between Detroit and Milwaukee across Lake Michigan.

IMPROVEMENT OF airports to assure continuation of air mail service was discussed at a recent meeting in Appleton, Wisc., of some 25 postoffice officials, airport operators and business men of the Fox River valley.

THE POSSIBILITY that Des Moines, Iowa, would be without an airport after February 28 until development of the new site is completed, was removed when Yellow Cab Airways, Inc., leased the present field near Altoona, Iowa, for one year. There is no connection between the new lease and the city's plans for a field at Southwest Twenty-first Street and Army Post Road. The project for an airport there will go forward as soon as the sale of the \$125,000 airport bonds is made.

OFFICIALS of United States Airways have received a franchise to form a new operating company known as Utah Airways, Inc., which will provide air passenger service between Grand Junction and Denver. The new company will seek air mail contracts for this route and later plan to extend the line from Grand Junction to Salt Lake. Equipment includes three Bellanca "Skyrockets" with Wasp engines, provided with superchargers having a 10 to 1 ratio.

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## SOUTH CENTRAL

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IMPROVEMENTS AT the Kansas City Municipal Airport continue with the construction of a dirt and rock levee for protection against the inroads of the Missouri River. City officials recently authorized the expenditure of \$58,000 for this purpose. The new radio range beacon is nearing completion, the antenna towers and building having been erected.

THE CONTRACT for the new \$150,000 air terminal building to be erected at Lambert-St. Louis, Mo., Municipal Airport will be let February 2, according to city officials. The Board of Public Service is at present receiving bids for the structure which will provide a union station for incoming and outgoing passenger planes, a restaurant and hotel accommodations.

OKLAHOMA CITY'S new \$425,000 airport, southwest of the city, will be dedicated February 15. Although the port has been in use for several weeks, dedication services have been held up

pending the completion of a new municipal hangar and the new municipal administration building. Space in the new central building has been let to National Air Transport, Transcontinental and Western Air, and to several smaller operators. F. C. Hall, backer of the Post-Gatty around the world flight and Wiley Post and Harold Gatty, themselves, plan to attend the dedication. Mr. Hall has announced that he will not sponsor another around-the-world flight next spring but will devote his entire time to the perfection of an organization, the "Legion of Veteran Airmen."

J. C. GIBLETT and Hardy Young, Oklahoma pilots, have organized the Giblett-Young Flying Service with headquarters at the Oklahoma City Curtiss-Wright airport.

DR. JOHN BROCK of Kansas City, known as the "Flight a Day" doctor has recently been appointed aeronautics director of the Kansas City Chamber of Commerce. Dr. Brock has made daily flights for more than two years and has visited every state in the union on his tours to promote interest in aviation.

COMPLAINTS HAVE been received that agents claiming to represent AERO DIGEST have received money for subscriptions without authority. One of these agents who drives a Chevrolet Sedan with a Mississippi license claims to represent a line of trade magazines in Mississippi, Louisiana, Alabama and Tennessee, says he is a student pilot and knows "everyone in aviation in that territory." Persons in this region particularly are warned against such unauthorized solicitors.

THE KANSAS CITY-St. Louis schedule of Braniff Airways has been changed so that the eastbound plane formerly leaving Kansas City at 8:00 A.M. will leave Fairfax Airport at 6:00 P.M., with arrival at St. Louis scheduled for 7:30. Formal opening of the new hangar and operating headquarters of Transcontinental and Western Air at the Kansas City Municipal Airport took place on January 15.

PLANS TO ADD a complete course in aeronautics, including ground-school work and actual flying instruction, to the curriculum of the Oklahoma A. and M. College at Stillwater, Okla., were announced recently. The college will be one of the few in the country to offer such study as accredited courses. The flying work will be conducted by the staff members of the McIntyre airport at Tulsa, Okla.

PLANES OF Oklahoma Aviation Service, Inc., will start using the new Oklahoma City municipal terminal about

February 1, it was announced recently.

Erection of the company's hangar was completed during January. Materials obtained by dismantling the hangar at the old airport were used.

CONSTRUCTION is about one-third completed on the Nashville-Louisville section of the Dallas-Louisville airway and all sixteen light towers have been erected. Beacon sites are being selected on the section between Dallas and Louisville.

All light towers, twenty-three in number, have been erected on the Albuquerque-Amarillo section of the Los Angeles-Amarillo airway and construction work is about half finished.

Major construction items also have been completed at thirty-one sites on the Phoenix-El Paso section of the San Diego-El Paso airway and lights are in operation at thirty of the thirty-one sites. It is expected that survey work will be completed within a few weeks for intermediate field and beacon sites on the Amarillo-Oklahoma section of the Amarillo-St. Louis airway.

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## NORTHWEST

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BEGINNING ITS second semester in January, the Broadway evening school, a night school of the public school system of Seattle, Wash., with classes twice a week, teaches aviation to interested pupils. A three-months' course will be given in flying under skilled vocational experts at a tuition fee that is simply a nominal registration amount.

A WEATHER STATION is to be opened at Spokane's airport early this year. Malcolm Rigby, who has been located at the municipal airport in Seattle, has been assigned to Spokane to take charge of the installation of equipment in the new station, which will include a projector, airport code beacon, and motor-driven flasher for code signals.

A FLIGHT from Seattle to Tokyo is now proposed by Japanese fliers for April. The proposed flight is to be made by N. Nogoya and K. Asai, who were recently in Seattle to discuss their plans with aviation authorities. A Japanese newspaper is said to be backing this proposed jaunt.

PLANS ARE NOW being made to extend the north and south runway on Seattle's municipal airport a distance of 2,000 feet. This would give Seattle one of the longest runways on the Coast, making the runway more than 6,000 feet in length. Among the general improvements being carried out at the Field this

winter has been the dredging of the south side.

A NEW ORGANIZATION to be known as the Mid-Columbia Aero Club was formed at Hood River, Ore., with a charter membership of 20, several of whom have had flying experience. Dr. R. G. McCall was elected president and Ormand Hukari secretary-treasurer.

ESTIMATED FIGURES for the year from Portland, Ore., based on 11½ months of business, show that transport passengers handled through Swan Island airport have totaled 7,894, as compared to 7,098 for 1930. Air express has totaled 1,798 pounds, as compared to 979 pounds last year. On short passenger flights from Swan Island, 2,465 passengers have been carried as contrasted with 2,058 in 1930. Transient planes arriving at the airport have numbered 758 as against 617 last year. Only the airmail has fallen off, with an estimated total of 232,783 pounds this year as compared to 295,304 pounds last year. Mail originating in Portland has totaled 144,179 pounds, and that coming in 88,604 pounds. The number of scheduled transport plane arrivals has been 2,385, with the same number of departures. Hop flights have numbered 1,831 and student flights have totaled 6,809.

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## SOUTHWEST

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IT IS EXPECTED that the Salt Lake City Airport will lose some of its business during 1932 due to the new routing through Amarillo and Albuquerque of the fast transcontinental service which went into effect on January 1. The night mail plane between Salt Lake City and Los Angeles each way also was discontinued on January 2. This means that Western Air will operate only one plane daily each way on this route.

Concerted opposition has been organized by Salt Lake civil groups to the proposal of Senator C. C. Dill of Washington to establish a northern transcontinental air-mail route from the Twin Cities west to Spokane, Washington, at the expense of Salt Lake, Boise, and Pasco on the Varney Air line, and Salt Lake, Pocatello, Idaho Falls, Butte, and Helena on the route of the National Park Airways.

ON THE HEELS of the announcement of the suspension of operations of the Air Ferries, Ltd., Walter T. Varney announced the organization of Varney Air Ferries to operate an amphibion service between Pier 5, San Francisco and the San Francisco Bay Airdrome, Alameda. Two 5-passenger Sikorsky amphibions have been ordered for the new service. Eight round trips will be made.

UNIVERSITY COLLEGE, University of Southern California, is cooperating with the California State Chamber of Commerce in offering a series of courses as suggested by the aviation industry. The elements of air law will be given by Thomas Hart Kennedy, a Los Angeles attorney and member of the Legislative Sub-Committee of Aeronautics, State Chamber of Commerce. The course will include among other things the treatment of state and federal regulations, the right to fly, and the law of negligence applied to aircraft. The plan of presentation will be non-technical, assuring a clear understanding of the subjects to laymen.

Other courses given will include aviation insurance and air transport management, by Professor Earl W. Hill of the University. Professor Hill is chairman of the State Advisory Committee on Aeronautical Education and Professor of Aviation at the University of Southern California.

ON DECEMBER 18, at the Oakland Airport, the Boeing School of Aeronautics graduated its seventh class of master mechanics and master pilots. Students in the master mechanic course, who are specializing in engines, completed 52 different projects in the engines laboratory during 1931, representing a complete major overhaul on Axelson, Wright and Wasp motors.

The 1931 record of the Flying Department shows that on but three days in the year was the regular flying schedule cancelled because of bad weather. On eleven other days the flying schedule was disrupted for from one to two hours because of weather.

SHORTAGE OF SPACE at United Airport, Burbank, Calif., has necessitated building a \$1,000 combination oil storage house and garage where oil supply for the two service trucks operated at the terminal will be replenished from a 2,000-gallon stock. The three 8,000-gallon electrically operated gasoline pits, which pump at the rate of 25-gallons a minute, keep the two trucks supplied with gasoline for fueling planes.

GEORGE T. CUSSEN has been placed in charge of the traffic of the Transcontinental and Western Air in Northern California to replace Frank Berdan who has been assigned to the Los Angeles office. Mr. Cussen has appointed Chingwah Lee as an agent in the interest of Chinese travelers. S. Akiya is the Japanese agent for the company in Northern California.

JAMES WEDELL, New Orleans flier, during his California wait for favorable weather to make the transcontinental flight, established a record of six

hours and forty minutes on the 1,400-mile one-stop-flight from Mexico to Canada.

CENTURY PACIFIC Lines recently added Salinas to the ports of call on its San Francisco Bay region-San Diego service.

JUANITA BURNS, Los Angeles girl flier, is receiving blind flying instructions from Lee Arany at United Airport, Burbank, Calif., in preparation for an attempted non-stop Tokyo-Seattle flight during April, 1932. A special speed plane with a 1,000-gallon gasoline capacity tank and powered by a 525-h.p. Pratt & Whitney "Wasp" motor, supercharged ten-to-one, is now under construction for her at Los Angeles.

A BILL TO place aerial transport under the Interstate Commerce Commission regulation has been introduced into Congress by Senator Bratton of New Mexico. Besides the regulatory feature, the Senator proposes to set up a declaration of national policy towards aviation development. Under the regulatory features, the I.C.C. would be given authority over any mergers, consolidations, or purchases of an air line by other lines, and rate schedules would be under its supervision.

THE AIRWAYS Division of the Department of Commerce has obtained a 10 year lease on the Corning Airport, Corning, California, which was founded in 1925 by Warren N. Woodson. The airport is to be operated as an intermediate landing field on the northern mail route. Improvements, including the installation of border lights, lengthening of runways and the construction of a drainage system, are planned by the government.

PAUL MANTZ, of outside-loop fame, has organized the United Air Services, Ltd., and has leased a considerable portion of hangar No. 1 at United Airport, Burbank, Calif., for operations to include charter trips, passenger flights, flying instruction, motion picture work and the U. S. Forest Air Patrol service in Southern California.

JUST THE PRECISE reverse of unemployment exists at the Boeing airplane plant in Seattle, where an employment peak has been reached recently. There are 1,200 men on the payroll catching up with orders for army and navy planes, and this employment peak is expected to be maintained for six months. New type bombers are being constructed for the U. S. Army, and work has been started on a million dollar contract for 75 single-seater naval fighters, which will be placed in service on the three naval airplane carriers.

A TOTAL OF 76,854 passengers was carried to and from San Francisco Bay Airdrome, Alameda, during 1931, according to the annual report of R. U. St. John, general manager. Of this number, 52,579 were carried by transport planes. Take-offs and landings totalled 38,264, transport planes accounting for 19,212 of this amount. The airport, now in its second year, reports a steady increase in operations.

Oakland Municipal Airport handled 11,577 planes and 29,529 passengers during the year. The total of 4,592 transient planes handled represents an increase of nearly one thousand planes. Student flights totalled 58,173.

MILLS FIELD, San Francisco, operations for the year were estimated by Capt. Roy Francis, superintendent, at 30,000 passengers and 20,000 flights. The figures for the last six months of the year were 18,897 passengers and 11,360 flights.

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## TRADE LITERATURE

### *New Pamphlets and Books of Interest to the Aeronautical Industry*

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#### SYMPOSIUM ON WELDING

AMERICAN SOCIETY FOR TESTING MATERIALS

THE eleven papers and discussions appearing in this volume were presented at a symposium on welding held at the second regional meeting of the American Society for Testing Materials at Pittsburgh, March 18, 1931, in cooperation with the Pittsburgh Section of the American Welding Society. The papers were designed to present the present status of the welding art and to promote discussion on the various types of weld testing.

Special attention is paid to the characteristics and interrelation of the newer steel welding processes, and the various methods of gas and electric-arc welding applicable to aluminum are discussed. One author takes up the stethoscopic examination of welded products while another describes the inspection of welding at the Watertown Arsenal.

#### *San Francisco Airport Report*

ACTIVITIES of San Francisco Airport from its inception up to the present time are described in this seventy-page booklet. Part One is devoted to the early history and development of the airport from the time it was first used as a central depot for air traffic, while the second part outlines the present and proposed developments to the airport. A meteorological report compiled from three years' record is included.

**Data on Aluminum and Its Alloys**

"ALCOA ALUMINUM and Its Alloys" is the title of the book recently published by the Aluminum Company of America to meet the ever-increasing demand for a reference book on these alloys. Information regarding the physical and chemical properties of the wrought and casting alloys produced by the company is given, with a discussion of the theory of their heat treatment, solution heat-treatment practice, welding, annealing practice, corrosion resistance, and their mechanical properties at high and low temperatures. Tables in the appendix show the sizes of the basic commodities which the company manufactures from the alloys, including commercial tolerances for the various commodities, as well as chemical composition, mechanical properties, and electrical conductivity of the various products.

**Haskelite Construction for Airplanes**

REFERENCE is made in the December issue of "The Haskel-Lite" to this product in the construction of certain airplanes. This pamphlet is a house organ of the Haskelite Manufacturing Corporation, Chicago, Illinois, producers of plywood, Plymetl, and Karvart.

**Michigan Air Laws**

ACCOMPANYING the December issue of the monthly bulletin issued by the State Board of Aeronautics, Lansing, Michigan, is a recently published pamphlet containing all of the Michigan laws relating to aeronautics. It was compiled by Frank D. Fitzgerald, Secretary of State, and is designed to supply information to those who did not keep in close touch with the changes in the air laws which were made during the last session of the state legislature.

**Autogiro News**

LATEST achievements of the autogiro are related in "Autogiro News," published by the Autogiro Company of America, Land Title Building, Philadelphia, Pa. The November issue offers a description of tests made by game protectors to determine the possibilities of the autogiro in the aerial policing of hunting grounds throughout Bucks and Montgomery Counties, Pennsylvania, as well as a discussion by E. L. Synnestvedt on the relation of the autogiro to life insurance risk on aviators.

**Pratt & Whitney News**

THE PRATT & WHITNEY "Bee-Hive" for December describes the initial flight of the giant "Hornet"-powered Sikorsky airplane piloted by Colonel Lindbergh. It also refers to the Royal Dutch air lines, K.L.M., users of its engines, and to the flight of Major Doolittle from Ottawa to Washington and Mexico City in a "Wasp Junior"-powered Laird plane.

**Airport and Aircraft Liabilities**

SKY LINES, house organ of the United States Aviation Underwriters, Inc., devotes its December 10 issue to discussions of the responsibilities and liabilities of airport and aircraft owners and operators. In view of the recent court rulings on aircraft accidents, it is thought that this edition will be of timely interest. Details of the U.S.A.I.G. finance plans for payments of aviation insurance premiums are included.

**Eastern Air Transport Bulletin**

NEWS WING is a monthly publication of Eastern Air Transport, Inc., a division of North American Aviation, Inc. It is an eight-page bulletin featuring news items coincident with its trans-

port operations and descriptions of new equipment put in service, as well as giving information regarding rates and timetables in effect on its various lines.

**Automotive Service Manuals for Mechanics**

A SERIES OF manuals on automotive maintenance work have been issued by the South Bend Lathe Works, South Bend, Indiana, to enable mechanics in the service shop to study the latest methods for repairing parts of automotive equipment. These manuals are one-job handy instruction booklets which cover the forty-nine most common service operations requiring precision work. The company also has published a four-page circular containing description and specifications of its new Junior eight-inch bench horizontal motor-driven and Simplex motor-driven lathes, as well as attachments, chucks and other tools required in their operation.

**Fabroil Gears and Gear Blanks**

A FOUR-PAGE folder issued by the Plastics Department of General Electric Company, Schenectady, N. Y., supplies information regarding the Fabroil gears and gear blanks which are a product of this department. Manufacturing processes involved in producing the gear blanks, as well as precautions to be observed in machining them and in operating the gears, are outlined. A graph compares the recommended values of safe working stress to be used in the Lewis Formula for computing the strength of steel, cast-iron and Fabroil gear teeth.

**Christening of the American Clipper**

PAN AMERICAN AIRWAYS, in its November issue, features the christening of the *American Clipper*, flagship of the international fleet of Pan American Airways System.

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# FOREIGN NEWS IN BRIEF

Compiled from correspondents' reports and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

AIR SERVICES in Asia have become numerous and extensive, as indicated by a compilation of the Aeronautics Trade Division of the Department of Commerce. Nine operating companies maintain local services measuring 24,931 miles, and four European companies (one German-Russian) operate air services covering 24,492 miles between Europe and Asia, and in Asia. Thus there are scheduled air services including 49,423 miles in Asia and connecting that continent with Europe. A large portion of the local services are in Russia where some schedules do not call for frequent flights and some are suspended in winter.

THE RATIFICATION of two air-transport agreements between Germany and Czechoslovakia has been reported. The first agreement has to do with the operation of services with landings on the territory of the other contracting party while the second takes up the operation of non-stop services. These treaties are based on and supplement that concluded on January 22, 1927. The first agreement grants an air operator named by the German government the right to operate four services between the two countries and a similar privilege is granted to an operator named by the other government. The second agreement provides that an air operator chosen by the German government may operate a non-stop Berlin-Vienna service, and that a Czechoslovakian company may co-operate two services over Germany without stopping in the latter territory.

## AUSTRALIA

A REGULAR AIR SERVICE connecting Daly Waters and Birdum Creek, in North Australia, was inaugurated by Q. A. N. T. A. S., Ltd., on December 3, under contract to the Commonwealth Government. This service is to operate for the four months of the wet season and to connect weekly the railhead of Birdum Creek with the air service which terminates at Daly Waters.

## CANADA

THE TRENTON AIR STATION of the Royal Canadian Air Force is now in use. One flight squadron has been transferred from Camp Borden and others will follow as accommodations permit. The new station is situated on the Bay of Quinte so that both land and seaplane operations can be handled at

the one base. It is understood that Camp Borden will continue as a primary training camp for some time.

A NEW commercial aviation company, to be known as Service Airways, Ltd., has been formed at Sydney, Nova Scotia, to meet the growing demands of trade between Nova Scotia, St. Pierre, and Newfoundland. This is the second company formed to operate across the Straits, and its incorporators are Cape Breton business men.

TO MEET Canadian flying conditions, a new Tiger Moth training ship has been designed in England and flight tested at the DeHavilland Company's field at Toronto where the ship will be manufactured. The machine has a stalling speed of thirty-eight miles per hour. Handley Page slots can be locked or unlocked from the cockpit while flying. The passenger's seat is set further back in the fuselage than in the standard job.

## CUBA

FIVE pilots were graduated on December 17 from the Cuban Army Aviation School at Campo Columbia, Havana. Capt. Anibal Vallejo and Lieut. Franz Felix, of the Army of the Dominican Republic, who were granted their licenses, are expected to organize the Dominican Air Corps. The opening of a flying school is expected in Santo Domingo, and Captain Vallejo probably will be the head of the new organization.

A new reduction in fares was put into effect by Compañía Nacional Cubana de Aviación Curtiss on December 1, and the time schedule also was changed, planes leaving at 7:30 a. m. from Havana and Santiago daily except Sundays. A regular mail, passenger and express service also was established between Havana and the Isle of Pines every Tuesday at 10 a. m.

## ENGLAND

THE "HELENA", last of the large four-engined airplanes which were built to the order of Imperial Airways by Handley Page, Ltd., has been delivered at the London airport. There are now eight of these 2,200-h.p. aircraft, four being equipped to operate on the India air-mail route eastward from Cairo, and the remaining four being for use on the continental service between London

and Paris. To render them particularly suitable for semi-tropical conditions on the India route, the eastern planes provide exceptionally spacious accommodations for eighteen passengers, whereas the planes on the Paris route seat as many as thirty-eight passengers. Provision is made on the eastern planes for carrying 3,500 pounds of mail and freight.

BEFORE the year is out, it is expected that many of the newer airplanes in the Royal Air Force war fleet will be equipped with engines cooled by an ingenious evaporative system in place of the water-cooling methods now employed. The new idea was tried out first in England on the engine installation of the R-101, and for several months fast day bombers driven by evaporatively-cooled engines have been flown on trial.

Evaporative, or "steam," cooling substitutes a condenser mounted above the engine for the large honeycomb radiator needed in the water-cooling system. Steam from the header tank located between the engine and condenser rises to the condenser where it is cooled again to the liquid state before returning to the engine circuit. Decreases in weight and drag, as well as vulnerability in war time, are claimed for the system.

LADY BAILEY, whose extensive flights alone in Africa rank her among the world's greatest women pilots, failed by only three points to win the first annual trophy offered in England for blind flying, in which the pilot steers entirely by the instruments on the dashboard, all outward view being obscured by a thick hood drawn over the cockpit. The annual competition was instituted recently at the air college operated by Air Service Training at Hamble, where many pupils are studying this new flying art. The trophy was awarded to Oscar Garden, an owner-pilot, who late in 1930 made a flight from England to Australia in a second-hand light airplane.

FINAL preparations have been made by Imperial Airways for the opening of its regular weekly air-mail service from London to Capetown. The first sections of the route, from England to Kenya Colony, have been in operation since last March, and already have proved of great utility in the rapid transport of mails and passengers to and from Central Africa.

The first machine on the regular weekly service to Capetown is scheduled to leave Croydon on January 20, and the mails are due in Capetown 11 days later, on Sunday, January 31. During the first month of operation, mails only will be carried, but after this the route will be available for passenger service.

WITH all the facts in mind, including the reports of Squadron Leader Gayford and Flight Lieutenant Bett, and forecasts of the weather experts, Air Ministry officials and Royal Air Force officers decided at a conference that the British attempt to set a new record for distance flown non-stop by an airplane in a straight line should take place in February.

A special long-range monoplane, which already has accomplished a non-stop flight of 2,857 miles from England to Egypt, is now at the Fairey Aviation Company's plant undergoing overhaul. One or two trials will be made before February 19 when the airplane is scheduled to take the air at Cranwell Airport on an attempted flight to South Africa without alighting. The ultimate objective is Capetown, 5,990 miles in a straight line from the starting point, and a distance 978 miles greater than the present world's record.

FLIGHT LIEUTENANT E. H. FIELDEN, personal pilot to the Prince of Wales, recently gave a demonstration of the mobility offered by the present-day light airplane when he flew from London to Algiers in eleven hours. The long-range "Puss Moth" monoplane flown was equipped to carry 125 gallons of fuel and was able to remain aloft for 25 hours at a time. The flier covered 1,150 miles at an average of over 100 miles per hour in spite of bad weather.

## FRANCE

AN AIRPLANE designed for stratospheric navigation will be tested in France within a short time by the manufacturer, Avions H. et M. Farman. It is expected that the plane may be flown at 60,000 feet, over 11 miles above the earth, and at a maximum speed of 310 miles per hour. The plane is similar to a Farman 190, has a wing surface of nearly 760 square feet, and is equipped with an eight-cylinder water-cooled 350-h.p. inverted type of engine. It has a four bladed, variable-pitch propeller, which is about 15 feet in diameter. The pilot's cabin is airtight and entrance is obtained by a conning tower similar to that in a submarine.

## GERMANY

A NEARLY 10-per cent increase in volume of passenger and freight services is reported by Deutsche Luft Hansa for the summer of 1931. Passenger rates were reduced but a special tax was levied on Germans leaving their country. The distance flown by company planes during these months was 6 per cent below that for the corresponding period of the previous year. On the special mail and freight services greater quantities of goods were transported from and to Paris, as well as London, Amsterdam, Copenhagen, and the Balkan countries. Air-mail and package service was maintained on the same scale as in 1930, but newspaper traffic, mostly from Berlin, showed a decrease.

## HAWAII

THERE is a daily passenger airplane service connecting Honolulu with the islands of Maui, Hawaii, Kauai, Molokai and Lanai. Twin-motored Sikorsky amphibians have been used in this service for more than a year and the operating company has had no serious accidents. The service has brought the various islands of the Hawaiian archipelago closer together, as the longest hop takes two and a half hours. The planes of this air fleet recently have been equipped with radio as an additional measure of precaution.

## ITALY

AIR experts of four nations have been invited by Premier Mussolini to meet for discussing plans for a regular international air service across the Atlantic. Wiley Post, Colonel Lindbergh, Clarence Chamberlin, Harold Gatty, and Mrs. Amelia Earhart Putnam are among the Americans invited. The delegates will be asked to decide what should be done to provide emergency landing fields at either the Azores or on the Greenland and Newfoundland coasts. They will take up also the possibility of anchoring floating seadromes along the route.

## JAPAN

THE Japanese Aeronautical Laboratory at Komaba recently completed research, which was begun by Dr. T. Tamaru five years ago, on high-altitude flight. High-altitude flight above 10,000 meters was thoroughly investigated by Dr. Tamaru in a low-temperature and pressure wind tunnel. Other experimental research at normal temperatures also has been completed.

SEMI-RIGID airship No. 8, one of the airships of the Japanese Navy, is being dismantled. This ship held a world's record for a 60-hour duration flight by a semi-rigid airship. The reason given for dismantling the airship was the change of atmospheric conditions in Japan which make an airship with a large gas bag unsuitable for air navigation there.

THE Japanese Army recently adopted, as a military airplane, a Type 91 fighter, made by the Nakashima Aircraft Works, which is said to have a good acrobatic performance. Another high-speed fighter, Type KD-5, designed at the Kawasaki Dock Yard at Kobe, also has been adopted as a military plane and is said to have even better performance than the Nakashima fighter. It is an all-metal monoplane powered by a water-cooled Kawasaki B. M. W. 600-h.p. engine, and has a top speed of 400 kilometers per hour, and a climbing speed of 1,000 meters in 50 minutes up to 5,000 meters.

The first Japanese seaplane fighter has been completed by the Kawanishi Aircraft Works at Naruo. It is a biplane and has a 450-h.p. air-cooled Jupiter engine. It is said to have good performance and will serve as a fighter or pursuit plane in the Japanese Navy.

## SOUTH AMERICA

LEONARDO SOTOMAYOR Y LUNA, Minister of Aviation, and President of the Aero Club del Ecuador, has under consideration the establishment of the first National Air Mail Service to operate between Quito and Tulcán on the northern frontier. The mail will be flown by military airmen in the Ryan monoplane *Ecuador* in which Theodore Gildred and Captain Dean Farran, U. S. Army, made a 4,500-mile good-will flight from San Diego, Calif., to Quito, Ecuador, in March, 1931.

THE Brazilian War Ministry's order for fifteen "Moth" training planes is considered as one of the first fruits of the British aircraft industry's drive in Latin America last spring, coincident with the British Empire Trade Exhibition at Buenos Aires. These new training craft will be the first British airplanes to be placed by contract in the Brazilian Army Air Service. Radio apparatus, night and blind flying instruments, bombs, electric camera, and rocket signalling apparatus are included in the equipment, and the maximum speed is well over 100 miles per hour. Similar craft recently have been supplied for flight training to the governments of Portugal, Sweden, China, Iraq, and Egypt.



## TAILLESS AIRPLANES

R. E. DOWD

**I**N view of the recent increase of interest in tailless airplanes, it would seem timely to take up this class of aircraft for our February "Experimental" subject.

It is unfortunate that there has been some confusion as to just what is meant by tailless airplane. "Tail first" or "canard" (duck) type planes are frequently called tailless because they have been deprived of the customary trailing empennage; but strictly speaking, the canards do not belong to the tailless class, for they most certainly have tails. The mere fact that the location of the tail has been changed with respect to the sustaining plane should not be sufficient reason to classify them with types lacking tails. It is difficult to believe that those responsible for this simple error are guided by a contention that, basically, a tail is a trailing appendage and that when it comes first it loses claim to its name. If this were the case, a horse would become tailless by simply backing up and consequently suffer the loss of his posterior decoration by simply changing his direction!

Without dwelling further on the irregularities of popular aeronautical nomenclature, let us simply agree that, for the duration of this article at least, a tailless airplane means one having no tail—



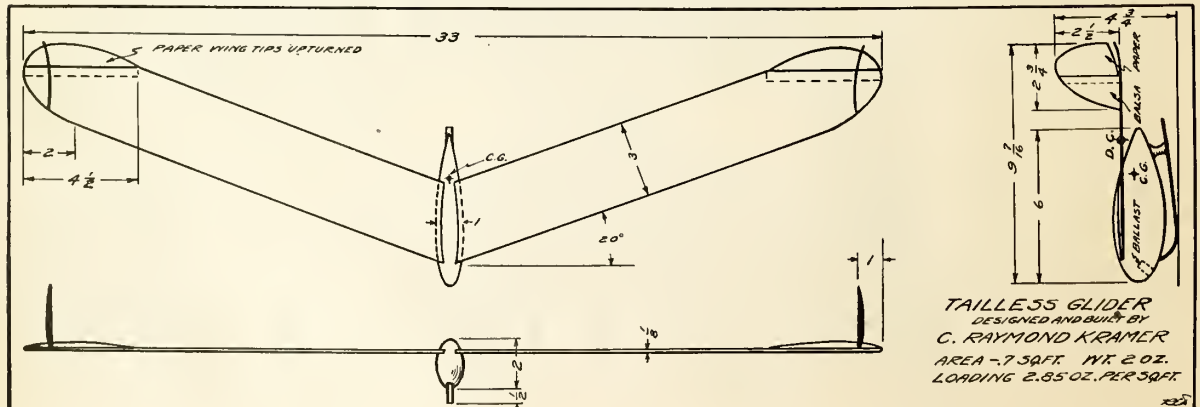
The German Lippish tailless airplane

units and stabilizing units are, under this classification, integral with the sustaining units.

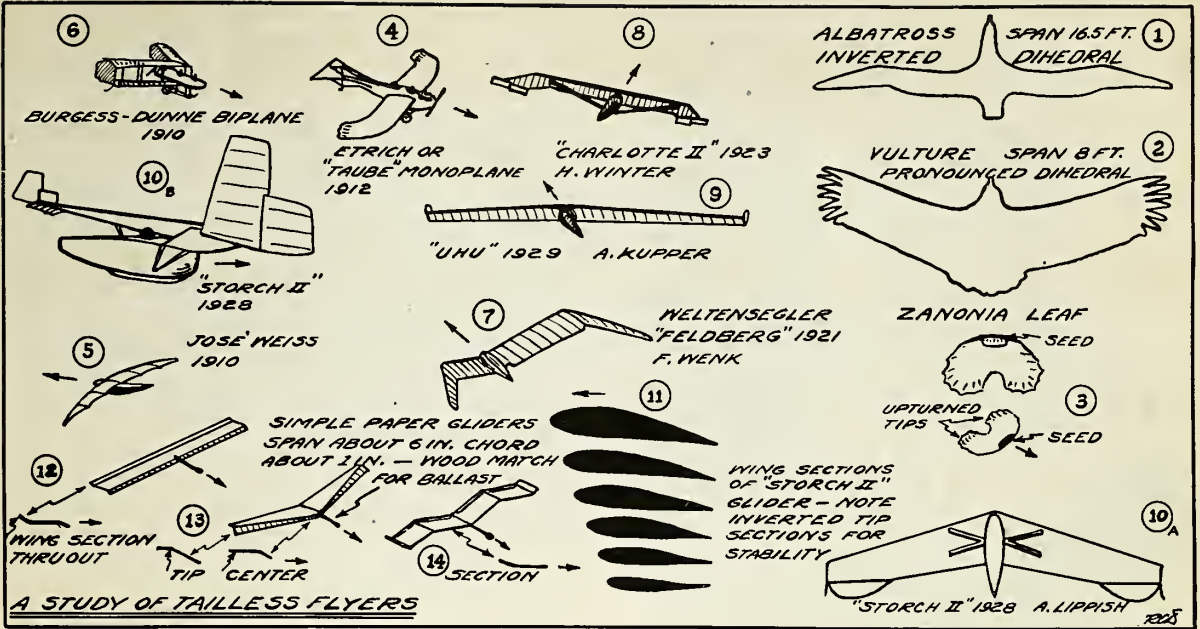
We are inclined to think of the tailless plane as a modern development. This is far from correct. Bent on faithfully copying the great soaring birds which

cruised majestically through the air without beating their mighty pinions, early pioneers often omitted tails from their machines. They blindly followed their natural models whose tails were either absent entirely or reduced to diminutive proportions. (Fig. 1 and Fig. 2). But nature had other tailless forms to offer. In the vegetable kingdom, the zanonina leaf, common in Java, provided a working model of a stable tailless glider capable of carrying its ballasting seed great distances from the parent tree. The secret was in the proper location of the center of gravity and the negative wing tips. (Fig. 3.)

Herr Etrich, a German student of aviation, constructed a large glider patterned after this leaf and later incorporated the principle of negative wing tips in his famous "Taube" (dove) monoplane. (Fig. 4.) At the beginning of the World War, Germany had many such military machines in service. It is evident that in the Taube design, the conventional tail was used for control, which, of course, takes it out of the actual tailless class. However, its predecessor, the glider, had no tail. Jose Weiss, a pioneer in aeronautical research who did his work in England, made many tailless flying models. These ranged from small sizes for hand-launching to man-carrying machines. Fig. 5 shows a rep-







representative model in free flight. They were patterned after bird forms with sweptback wings and flexible trailing edges. The stability inherent in these designs proved satisfactory in the many models tested.

About contemporaneous with Etrich and Weiss, Captain Dunne of the British Army brought out the famous Dunne biplane (Fig. 6) known later in America as the Burgess-Dunne because of an affiliation with the American Burgess interests. This machine possessed a very unusual appearance. Its great long biplane wings were swept back sharply and had vertical panels at their tips. The wing tips were fitted with controls at their trailing edges so that in reality it had two tails rather than none at all. Unlike the Etrich with its upturned trailing edges at the wing tips, the Dunne had downturned leading edges increasing toward the tips. The principle was much the same, however, for an air load in normal flight was being carried on the tips *behind* the center of gravity. If the angle of attack of the whole plane increased, the center or front portion of the main plane would stall first, while the tips would lose their air load and actually *lift*. This increase in lift, being located rearward of the center of gravity, would restore balance. Similarly, any tendency to dive was corrected by the rapidly increased air load on the tips as the angle of attack was reduced.

The Dunne machines were so stable that the pilot could leave the cockpit and climb about the machine without disturbing its balance. Indeed, in one case, the pilot effected repairs on his engine as the great plane glided slowly down in

perfect equilibrium.

In the early days experimenters worked on tailless designs in quest of more perfect stability. Standard designs taxed the strength and ability of pilots to keep them from plunging in a dive or rearing upward like a frightened steed. Many had lifting tails and were utterly devoid of inherent stability. On the other hand, the tailless types were frequently so intensely stable that the prevailing winds ruled the machine rather than the controlling efforts of the pilot. As a result, most pilots preferred to depend on their own skill with a tricky plane than on a wayward mount which kept them worried and guessing from one minute to the next.

During the past ten years the tailless type has been revived in the interests of efficiency. Tails and fuselages necessarily mean weight and resistance. These both reduce efficiency by reducing payload and flying speed. A further incentive was the development of large planes with wings of such great thickness that personnel and engines could be easily accommodated. In short, a "flying wing" might be the airliner of the future, traveling faster and lifting more with less power.

It is but natural that Germany, whose work on high-performance gliders had led research in that direction for the past ten or twelve years, should take the lead in this field also. Figs. 7 to 10 show gliders of this type. All have been relatively successful, but the records for altitude, distance and duration, are still held by the more conventional machines.

In recent years a young German engineer, Herr Lippish, has done commend-

able work on tailless machines. His "Storch II" is shown with typical profiles (Fig. 10 and Fig. 11). It will be noted that the sweepback of the wings is minimized and the tip sections are inverted. The overall efficiency has been increased to a point where a speed of slightly under 80 miles per hour has been achieved with but nine horsepower. The gliding angle of the power-driven "Storch" is so flat that it has been necessary to provide wing-tip drag surfaces to increase drag and thereby reduce the gliding angle for landing. Without this provision a landing field of excessive proportions would be required.

Without becoming involved in the more technical aspects of the design of tailless airplanes, it scarcely needs to be pointed out that further research in this field is highly commendable. There has been but little such activity in America. In fact, the only full-sized machine of this type, built recently in Florida, appears to be that sponsored by our late pioneer, Glenn H. Curtiss.

**The Kramer Tailless Glider Model**

For the purpose of encouraging experimental work in the tailless field, we produce drawings of a highly successful model glider designed and built by C. Raymond Kramer of Flushing, Long Island, New York. Mr. Kramer is an aerodynamics student of New York University.

**Details of Construction**

A solid block of balsa carefully streamlined makes the fuselage. After completely forming, the top portion is sliced off to provide the wing mounting.

(Continued on page 54)

- \* UNITED AIR LINES
- \* PRATT & WHITNEY
- \* VOUIGHT
- \* STEARMAN
- \* BOEING
- \* SIKORSKY
- \* HAMILTON

AIR—HOT AND OTHERWISE

(Continued from page 28)

guns. Certainly, he argues, aircraft are not experimental, nor are landing decks.

Admiral Moffett, in urging the immediate construction of at least two flying-deck cruisers, quotes Rear Admiral Laning, president of the Naval War College, as saying that not only should we hold on to the present allowance for carriers and flying-deck cruisers, but that we need an increase in these categories.

"Either because of geographic conditions or of shore bases already held," he says, in repeating the ideas which have been proved sound in war games, "other countries will be able to establish large numbers of shore-based aircraft in any war area, whereas about the only aircraft we will be able to operate in those areas, at least in the war's early stages, will be from ships."

He therefore regards the maintenance of our carrier and flying-deck cruiser tonnage at a high level as comparably vital to retention of capital ship tonnage. Not even with our present allowed carrier tonnage, he is sure, can we hope to be as strong in the air in critical war areas as other countries can make themselves with shore-based aircraft. Further reduction of our already inadequate air ability in such areas would be catastrophic, he maintains, and never should be tolerated.

Admiral Moffett expects strong effort at the next conference to reduce both allowed carrier tonnage and flying-deck cruiser tonnage. At London the first proposal was to reduce carrier tonnage to 80,000, then the figure was put at 100,000 and finally at 125,000. Considering our present carrier tonnage absolutely essential to our national safety, it is his belief that we must not consent to its reduction by a single ton. He adds:

*"If we actually build, lay down or even authorize these vessels, our position will be infinitely stronger than otherwise at the next conference."*

Admiral Moffett was in favor of the London Treaty, and said so, but made the provision that we must build to treaty limits before the expiration of the treaty. He believed that the American people would accept the treaty and build up to it in good faith because a limit had been set which, as we built to it, would not be outbuilt by others.

Admiral Moffett agrees that good reasons exist for not entirely building submarine and destroyer tonnage before the treaty expires, but he favors construction of the complete balance of available carrier tonnage, amounting to 87,100 tons, before that fateful date which will be December 31, 1936.

"If the submarine," he asks, "with a sub-surface speed of only 12 knots and carrying but a few hundred pounds of explosives, with a range of only a few hundred yards, nearly won the last war, what will a vehicle having a speed of 200 knots and carrying torpedoes and bombs totalling 2,000 to 4,000 pounds of explosives, do in the next war?"

"The importance of aviation cannot be over-estimated," he adds. "Let us, before it is too late, take full advantage of our opportunity for building the vessels that will make possible the full use of this most modern of offensive and defensive devices, not only because of its future importance in all Naval warfare, but because it is necessary to the fleet for its protection and enormously increases its offensive power."

\* \* \*

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**I** WONDER if the members of the Appropriations Committee have taken the time and trouble to learn what the Federal airways, which are now in the position of begging for the money which should be eagerly thrust upon them through the Aeronautics Division of the Department of Commerce, are doing for their own States.

Congressman W. B. Oliver is from Alabama. Alabama has three Federal Airways (1) that portion of the Southern Transcontinental Airway which runs from Birmingham to the Georgia State line, amounting to 95 miles; (2) the route from Mobile, via Montgomery, to the Georgia State line on the New Orleans-Atlantic Straight Line Airway, amounting to 234 miles; (3) that portion of the old New Orleans-Atlanta Airway between Birmingham and Selma, amounting to 90 miles.

Thus in Mr. Oliver's State are 419 miles of Federal Airways—a nice quota, which adds greatly to the potential prosperity-equipment of his State for use during the period of come-back toward which we are all looking.

The Federal Airway mileage in the State of the Hon. Thomas L. Blanton, member from Texas, is much greater. Here is a summary which, perhaps, will interest him. It concerns only matters wholly within the boundaries of the State he represents.

The number of Federal Airways in the State of Texas is eight. The Southern Transcontinental Airway, the section between El Paso and Dallas, is fully developed. East of Dallas, at present, are day aids only, but this portion will be lighted during the fiscal year of 1932, giving a present mileage of 580. The mileage of the Brownsville-Fort Worth Airway is 505. From the New Mexico State line to the Oklahoma State line, through the thriving city of Amarillo (which has been greatly benefited thereby) runs the Mid-transcontinental Airway for 170 miles. The Fort Worth—Wichita Airway operates from Fort Worth to the Oklahoma State line, a distance of 90 miles. In addition to these lines, the Fort Worth—Kansas City Airway follows the route of the Fort Worth—Wichita line to Ardmore, Oklahoma; the Brownsville-Houston Airway follows the Brownsville-Fort Worth Airway from Brownsville to Kingsville, day aids only being provided from Kingsville to Houston. Between San Antonio and San Angelo day aids only are provided. The Dallas-Texarkana section of the Dallas-Louisville Airway, now equipped only for day flying, will be lighted during the 1932 fiscal year.

These 1,345 miles of airways, already lighted and in full operation, should greatly swell the justifiable pride of Mr. Blanton, and incline his heart to do whatever may lie within his power to advance the general cause of aviation in America.

The Hon. A. J. Griffin, of New York, has especial reason for pride and for particular interest in the promotion of America's aeronautical facilities. Within his State, or serving New York City (which, indeed, is served by all the air lines of America) we find the direct New York to Albany section of the New York-Montreal Airway, 134 miles; part of the Cleveland-Albany Airway from a point north of Erie, Pa., to Albany via Buffalo and Syracuse, a distance of 356 miles. The Atlanta-New York, the Boston-New York City, and the Chicago-New York Airways all serve New York City, although requiring no aids to flying within the borders of New York State. The total of aided New York State mileage is 490 miles.

Mr. Tinkham, of Massachusetts, has within the borders of his State, and of vast import to Boston, that State's

*(Continued on following page)*

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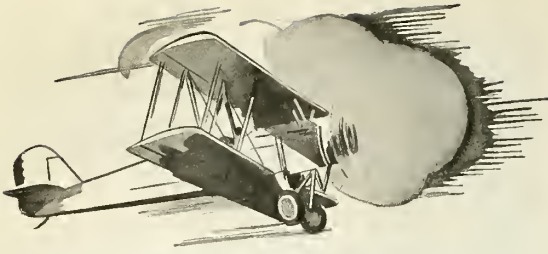
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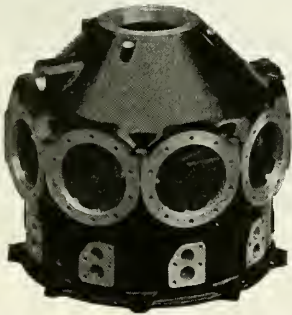
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*(Continued from preceding page)*

great metropolis, 55 miles of the New York-Boston Airway, and a lighted airway from Albany, New York to Boston, via Springfield, was announced on January 14th, this year.

Now consider the special reasons why Hon. Milton W. Shreve of Pennsylvania should be interested in the development of aeronautics. Within his great and busy State are 770 miles of fully developed airways at the present moment, certainly a great asset to it, including 275 miles of the Chicago-New York Air Line, 310 miles of the Columbus-Philadelphia Airway, 140 miles of the Washington-Cleveland Airways, a small 45 miles' stretch of the Atlanta-New York Airway, and a little 15 mile bit of the Cleveland-Albany Airway, where it skirts Lake Erie. Mr. Shreve's State must profit greatly from these 770 miles of lighted Federal Airways within its borders.

In Missouri, the Hon. Clarence Cannon's State, are four Federal Airways, with total present mileage of 550 miles, and more projected. There are the 238 miles of the Kansas City-St. Louis Airway, the 122 miles of the Kansas City-Omaha Airway, the 190 miles of the Kansas City-Chicago Airway, and, in addition to this generous contribution to aviation by the Federal Government within Missouri's boundaries, the Amarillo-Kansas City Airway, which is of large service to Missouri, although it contains no aids to flight within the borders of the State.

Thus four members of the Appropriations Committee, picked quite at random, have an actual stake in aviation and should be friendly to the reasonable requests of the Department of Commerce in its behalf.

Along with the Army Air Corps and the Bureau of Aeronautics, the Department of Commerce division headed by Col. Young, has been hampered by the budget. As submitted, all possibility of improving any of the Federal Airways is eliminated and there seems to be danger that in the rush to put through all sorts of relief measures, this most important development of American commerce, potentially a great aid to recovery, may be overlooked.

We wonder if the members of the Appropriations Committee have taken the time and trouble to find out what these cuts will actually do to hinder activities in their own States. We call the facts to their attention hoping that they may stimulate in their minds a desire to give Col. Young's department enough money to carry on the excellent work now being done under his guidance.

There are tremendous and fateful reasons why every

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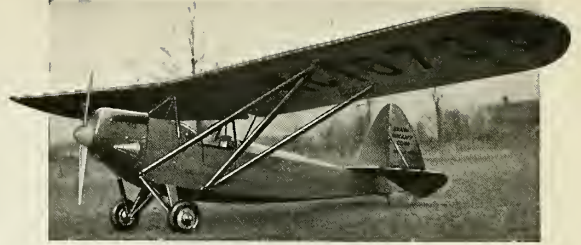
DR. MICHAEL WATTER

*Consulting Aeronautical Engineer*

220 West 42nd Street - New York City

consideration, even in these days of retrenchment, should be shown to Col. Young's activities under the Department of Commerce. The development of the Federal Airways has been, is, and will be, to the growth and usefulness of commercial aviation in the United States what the development of improved roads was to the growth of motoring and the automobile business.

The development of aviation, with entirely reasonable aid from the Federal government, will tend to stimulate and speed national recovery.



**WHY LEAVE EARLY?**  
(Continued from page 31)

mileage on an airline. Crashes are dramatic; statistics are not.

An automobile advertisement mentioned the last word in driving control—free wheeling, synchronized gear shifting, automatic starting, cushioned power, and a steering gear that automatically righted itself after a turn—in short, everything but an actual human driver. And there's the weak point in automobile safety: the public supplies the driver.

And in aviation the greatest danger, outside of starvation, still is cockpit trouble. There are, always have been, and I believe always will be pilots who invite Old Man Trouble to step aboard. And he invariably accepts the invitation.

What, for instance, can we do about comparatively green pilots with no experience of instrument flying, who deliberately fly into weather that proves too tough for them? Nothing but pick up the remains.

Stunt flying and bad weather flying without adequate equipment and experience are in the nature of circus stunts. Of course, stunts may win the applause of the crowd. But the aerial acrobat would do well to ponder at times upon the fact that there isn't a net under him.

However, such a suggestion is useless when a pilot continues deliberately to place himself in positions from which he may so easily be shuffled off this mortal soil somewhat earlier in his career than he had counted on. I sigh regretfully at the sadness of it all, but suspect that nothing much can be done to improve matters. It seems to be a case of bold to-day and cold to-morrow.

Then there is the sad case of the semi-pilot who buys  
(Continued on following page)

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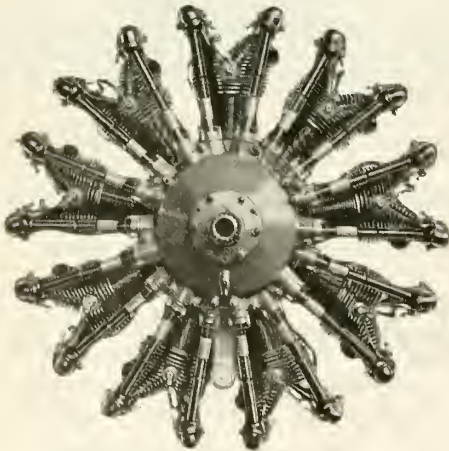
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*Front view Lycoming Model R-680,  
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*(Continued from preceding page)*

himself an airplane under the delusion that he can fly it, when as a matter of safety he should hire a pilot. I have a friend who, like Dick Grace, is a champion crash pilot. The chief difference is that Dick Grace gets paid for his movie crashes and my unfortunate friend pays for his. His standard procedure is to take off, fly away, land on a fence, and come home followed by the airplane on a truck.

When it is patched up, off he goes again, down he comes in due course, and back they haul him for more repairs. In two instances they had to patch him up, too. Why he selects fences and trees to land on, I don't know. Temperament, I suppose. Last year his flying cost him \$150 an hour, which I consider reasonable for the type of flying he performs.

On his last flight to California he paused in Texas. The instant his wheels, undercarriage, propeller, fuselage, engine, and wing touched the ground he was \$2,000 poorer. When that lad lands an airplane it stays landed. What a gift he is to the factory!

### AN ADEQUATE AIR FORCE NEEDED

*(Continued from page 27)*

passive defense is dangerous and we may expect it to be concentrated and used full force on the critical objective. European nations (all of comparatively small area and hence with vital areas open to sudden attack from one and usually two neighbors) have organized their air forces separate from their armies and navies. Whether or not such a course is advisable for us, and there are many objections to it, we are concerned more with the character and philosophy of use of the forces which may be used in an attack on us than with their organization.

It is hardly conceivable that we should be attacked at all by an enemy which does not possess the superiority of forces, air, land and sea, required for initial success. Having superiority, he has the initiative and can choose the time, place and method of attack. We must be prepared, therefore, to counteract air force by air force as well as army by army and navy by navy.

Our War Department was formerly responsible only for ground forces. Under our defense organization it now becomes responsible both for the army and the air force, forces which are not interchangeable. This significant fact must be recognized by our country and the War Department must be given the additional support required to carry out its dual function. We can not change our defense problem to fit our organization. We must make the organization capable of meeting the coordinated effort of enemy air, land and sea forces. To do this our air force must operate in defense as dictated by the situation. Its functions are the same as the independent air forces of Europe, no matter what our organization may be or what are our wishes.

With the construction of the Panama Canal, this country became, from the defense standpoint, an island nation. By it we are enabled to divide our fleet so as to maintain active, and hence efficient, naval bases on both coasts and to concentrate in either ocean as demanded by the situation. The loss of the Canal by an air raid launched as a sudden declaration of war might find our fleet divided or in the wrong ocean. Our air force with its capacity for destruction is capable of denying important waters close to our coast to enemy naval forces and to troops in transport vessels. It may thus remedy what would otherwise be a catastrophe.

*(Continued on following page)*



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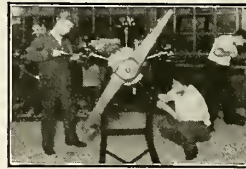
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*(Continued from preceding page)*

Fleets, like air forces, must be concentrated to be effective. They can be in only one area at a time. The air force with its tremendous speed and its interior lines of communication can either augment the fleet close to our shores or perform a limited but vital fleet function in its absence from an area suddenly become vital. The development of air forces has had a profound effect on sea power as well as on land operations.

An army alone cannot contend against the combined action of an army and an air force. Nor can a fleet perform its function against an inferior fleet within the radius of action of a supporting air force. Without an air force capable of at least neutralizing an enemy air force, the premise on which our whole defense structure is based becomes false.

National defense forces may be compared therefore to a tripod with the legs air force, army and navy. One weak leg and the whole structure totters. Strength in one does not compensate for weakness in another. Incidentally, fleet air components are not a part of the air force. They are part of the fleet, having, therefore, a naval mission and not an air force mission.

It is inevitable that the next war will open with a determined attempt to gain air superiority at the outset. One or another of the air forces will be quickly destroyed. The production of military airplanes requires time and our estimates are that it will take at least six months to replace the air force maintained in time of peace. During this period, if our air force is the one which is lost, our army, our fleet and our national resources will be at the mercy of enemy aviation.

President Coolidge in his speech on Armistice Day, 1928, gave the ultimate cost of our share of the World War as \$100,000,000,000, which represents one-half of the national wealth of the United States in 1917. This includes pensions, cost of the Veterans Bureau, and such other items which naturally continue for a generation or two after any national emergency. Based on this amount, the actual period of hostilities' cost is slightly more than \$7,000,000 per hour. With these figures in mind, had we been prepared in 1917 and could have started active participation ninety days earlier, there would have been a saving of about \$15,500,000,000. Preparedness is the best exponent of economy. The amount thus saved would have been greater than all the war debts owed the United States by foreign countries.

Air power has as an underlying basis a competent aeronautical industry and a flourishing commercial activity. Without them the cost of an air force is exorbitant and war-time expansion is slow and inefficient. There now exists in this country the fundamental basis required to make us invulnerable from attack if we but take advantage of it. Without an adequate air force we are wasting an inherent strength for defense which could be provided at a comparatively small cost.

## THE GIANT FLYING WING

*(Continued from page 35)*

Aerodynamically, where the earlier Dunne and Hill types used a high degree of wash-out towards the tips for longitudinal stability, and the German types previously noted use inverted airfoils at the tips to a normal one at the center for the same purpose, we use a method we believe will off-

set the aerodynamic losses inherent in the earlier models. We expect to create in an airfoil a reversed center-of-pressure travel so positive as to make a wing stiffly stable to the extent that it would have but one level speed and control power subordinate to the inherent righting moments. Under this adjustment, the ship would fly level at one speed and power setting. Increase of power would cause the ship to climb and throttling would effect its descent—still at one fixed forward speed.

As this arrangement would limit the possibilities in a commercial transport (although in many respects it may be the wisest method for the amateur's ship), we will incorporate an adjusting device whereby the camber may be changed in flight to trim for other safe attitudes and speeds.

We find it is possible for the designer to compromise between any desired degree of stability and control. The product can be designed so stiffly stable to the extreme that an amateur's errors of judgment in control would be automatically corrected by the inherent stabilizing qualities, or the opposite extreme where a constant center of pressure would necessitate experienced facility of control.

The controls are greatly simplified. The ailerons are contiguous to the supporting surface, differentially operated to serve their normal purpose, and simultaneously operated to function as elevators. The fin is eliminated. In addition to its duty in the normal plane of bringing the center of side area aft of the c.g. (which it is not necessary to do in this design), its function in securing directional stability is replaced by the large sweepback of the wing. In fact, all control areas and devices are put to useful purpose as supporting area. Structurally we are faced with high torsional stresses, but not to the extent that they necessitate the employment of impractical methods.

An interesting feature of the Dunlap flying-wing project lies in the translation of power. The first installation may consist of conventional internal combustion engines, two connected through clutches to each variable-pitch propeller. The layout will permit a mechanic to make simple adjustments or repairs to any engine while in flight, as the engines would be within the wing and one may be cut out by disengaging its clutch. At the same time, however, arrangement is being made for the later installation of an external combustion power plant.

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# NICHOLAS-BEAZLEY

## THE PARASITE DRAG

(Continued from page 34)

drag coefficient' is referred to the wing area, and not to the cross-section. The minimum drag coefficient of the wings with a thickness of 0.1 was seen to be about 0.01. Referred to the thickness cross-section, this gives again a parasite drag coefficient of 0.1, in keeping with the previous statement.

Parts not well streamlined have a coefficient about half-way between 1 and 0.1. Honeycomb radiators can hardly be considered streamlined; their coefficient seems to be 1. Wheels have 0.40 to 0.50; fuselages and floats down to 0.20. This does not include engine cylinder heads protruding from the fuselage. Streamline wires, in spite of their fine shape, do belong to the objects that are only imperfectly streamlined; their coefficient is as large as 0.3, because their dimensions are small. At these small Reynolds numbers, streamlining is less effective than in the case of struts. Fittings and other objects sticking out from smooth surfaces cause not only their own resistance, but in addition increase the drag of the larger object from which they project. They must therefore be considered with a drag coefficient of 2, unless they are well streamlined by themselves.

The drag area of the powerplant, whether it be cylinders or radiators, is relatively large and, at high speeds, the powerplant absorbs a large part of its own power. Considerable progress can be expected from in-line air-cooled engines. In the meantime, good cowling in the region of the cylinder heads of radial engines, or the Townend ring, consisting of a circular air guide connecting the cylinder heads, gives some relief. As an illustration of the importance of keeping the engine drag small, a 200-horsepower radial engine without such streamlining has a coefficient of about 2.4. Hence, with a propeller efficiency of 70 per cent, the engine would absorb all of its horsepower at a speed of little more than 200 miles per hour.

The drag of wing bracing adds up. Struts behind each other have practically the same drag as if they were side by side. Cables are not very prominent to the vision, but they have a large drag coefficient. They involve also many turnbuckles and similar parts. Cantilever wings improve the speed in general, even if thicker sections have to be employed.

With lighter-than-air craft, all drag is parasite drag in ordinary flight. The parasite drag of dirigibles is therefore even more important than that of airplanes. The drag of dirigible hulls is often referred to the volume, rather than to the cross section, because the lifting power is likewise given by the volume, and proportional to it. A drag coefficient derived from the volume indicates, therefore, a relation between the drag and the lifting power. It is not admissible, however, to divide the drag directly by the volume. This would not give the correct physical dimension, but the result would depend on the units used and would be far from universal. It would not give the same coefficient for the same shape, but the coefficient would depend on the size. Such computation would not be in keeping with the square law. The drag must be divided by the dynamic pressure and by an area. An area has therefore to be computed from the volume. This is done by lowering the volume to the power  $2/3$ . The computation is performed by first squaring the volume, and then computing the third root of this square. (Tables exist for reference.) Geometrically regarded, the transformation is

equivalent to the determination of the face of a cube with a volume equal to the hull.

The drag coefficient of complete and conventional airships, referred to the dynamic pressure and to this two thirds of the area of the volume, goes down to 0.02. With large and well streamlined airships with a shorter length-diameter ratio than now employed, the drag coefficient may go down even further. The two-thirds area of the volume is larger than the cross-section of the hull. Referred to the cross-section, the drag coefficient of dirigible hulls (and of streamlined spindles) is accordingly larger, and will hardly be smaller than 0.05.

Generally speaking, the drag coefficient referred to the cross-section varies between 1.0 and 0.1 according to the fineness of the streamlining, with 1.2 and 0.05 as extreme values when the streamlining does not exist or is extremely well carried out. Even with a parachute, where all efforts have been made to obtain as high a drag coefficient as possible, the drag coefficient is not much larger than 1.2, referred to the projected area; this is much smaller than the surface area.

Of the different performance items, parasite drag diminishes the most important one—speed. Superior speed is (or should be) the distinguishing characteristic of aircraft, and without a superior speed the chief stimulus for the use of commercial aircraft, except perhaps for special applications, would not exist. The present speeds of commercial aircraft, 100 to 120 miles per hour, are the lowest values necessary to outweigh disadvantages of the airplane.

Two ways seem to be open for diminishing the drag. One lies in a radical change of the type, eliminating sufficient parts, or reducing their size, and thereby eliminating their parasite drag, though not diminishing their coefficient of parasite drag. The other way lies in diminishing the drag coefficient, by favorably influencing the air motion, by guiding and moving it by special means. Both methods are not yet a reality, but they may become reality soon, probably in combination with one another, bringing about a greater aviation than we have now.

The parasite drag and the lift of airplanes is proportional to the area. It appears then that the increase in the size of airplanes does not improve, or improves but little, the ratio of the lift to the drag. The weight of the structure per unit area will, however, become larger. There is therefore a natural limit in the size of airplanes, beyond which they are not practical. This refers to future types as well as planes of the present day. The limit may be higher in the future and indeed it is not possible to state any particular limit, but it exists nevertheless.

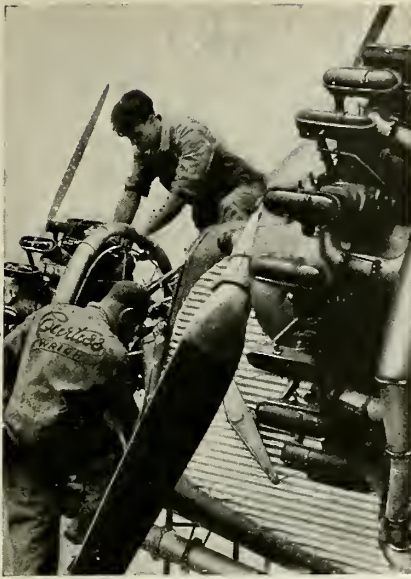
With dirigibles, the drag is likewise proportional to the area. The lifting capacity increases, however, with the volume. With dirigibles, as with surface ships, the ratio of lift to drag becomes better as the size is increased. With dirigibles, therefore, there exists a lower limit of size, where the ship is practical, but it seems that there is not an upper limit, except for reasons of economy and the like. The consideration of the parasite drag, therefore, points to airships as practical for large units, and to heavier-than-air craft as practical for small units. There are of course many other considerations besides the parasite drag, and in no way can such a short discussion settle the question; but it is, however, a factor which will influence the final answer.

*This is the twentieth of a series of articles by Dr. Max M. Munk. Copyright 1932. All rights reserved by the author.*

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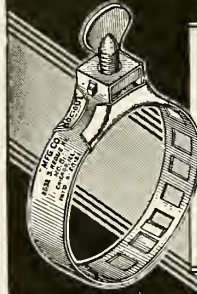


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"We have had the greatest expansion of modern times. Reaction had to come—will prove healthful. Nothing can stay the rapid progress of the Republic. She is all right."



WHEN DEEP, DARK GLOOM RULED IN 1921, THOMAS FORTUNE RYAN SAID:

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## AVIATION IN CHINA

(Continued from page 33)

China presents no serious climatic or other serious obstacles to flying. In Manchuria, however, the winter is extremely cold and as a result nearly all airplanes there use air-cooled engines owing to the difficulty of starting in cold weather. Fuel is supplied principally by the Asiatic Petroleum Company and the Standard Oil Company of New York, which are well organized and equipped throughout the country.

A potential field is offered in China for the sale of aircraft, and the leading suppliers in America, England and Germany are represented there. Competition is keen but the sale of machines in this market bristles with more difficulties than in any Western country; there is the question

of transport, as planes must be brought there to give demonstration flights, entailing considerable expense without the certainty of a sale. Business transactions in China take much longer to close than elsewhere, due to the Chinese mentality of doing things. Then there is the exchange factor, which constantly fluctuates with the almost daily variations in the price of silver. The present low value of the local currency has adversely affected business in airplanes just as it has many other lines and commodities which are imported. Payment is usually on the deferred payment system and in the meantime exchange may fluctuate as much as 50 per cent or more. These difficulties should not deter manufacturers of airplanes or parts from entering this market; it is essential, however, to be well represented in China, preferably in Shanghai.

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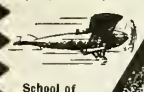
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**DE HAVILAND GIPSY MOTH**, Cirrus engine. N.C. license; 165 hours. Excellent condition. \$850.00. AERO DIGEST, Box 1267.

**LICENSED OX-5 TRAVEL AIR** and Waco 10, just completely rebuilt and recovered. Cheap. Consider cracked plane or air-cooled job in trade. Col. A. S. Boyers, Boyers Airport, Melbourne, Kentucky.

**SPORTSMAN** offers Sikorsky S-36, Wright engines. 4 hours since complete ship and engine overhaul at factory. Biggest bargain ever offered for a like-new, 8-place ship. Only \$3800. Wire deposit. AERO DIGEST, Box 1268.

**FOR SALE, SEAPLANE:** A real bargain. J-5 220 h.p. Waco land and seaplane. Ship is equipped with Edo DeLuxe pontoons, steel propeller and Heywood air starter. Complete undercarriage goes with this ship. Can be licensed either on land or water. A wonderful performing ship. Make us a proposition. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**MILLERIZED ROBIN**, N. C.; steel prop; oleos; 200 hours; just overhauled; spare radiator, motor; \$700. Harry Fleming, Box 55, Linwood, N. J.

**COMMAND-AIRE** Axelson 150. Outrigger landing gear, glass panel windshields, special built job, Berryloid finish. Like new. Best offer takes it. R. L. Duckworth, 735 Cecil Avenue, Louisville, Kentucky.

**STINSON JUNIOR**, Lycoming powered; privately owned; leather upholstery, airwheels, motor-ring; perfect condition, always hangared. Only 10 months old. Priced right. Fire Equipment Sales Co., Martin Bldg., Birmingham, Alabama.

**LATEST MODEL OX-5 American Eagle**, N.C. licensed, perfect. Always hangared. Free instruction to buyer. Bargain for cash. Fritz Von Briesen, Box 441, Sheldon, Iowa.

**FOR SALE:** Two-place Golden Eagle, same as new. Velie motor, just tested since major overhaul. Make offer. Paul Bradford, 7 Front St., Marlboro, Mass.

**BRAND NEW 1932 American Eaglet**, Szekely 45 h.p. motor. Cost new \$1575. Sell for \$1275. AERO DIGEST, Box 1272.

**BEST OFFER TAKES OX-5 AK Swallow** flyaway or new Pilgrim 21 monoplane, less motor. Floyd Canfield, 1319 Kossuth St., Bridgeport, Conn.

**FOR SALE:** Brand new Szekely-powered Buhl Bull Pup. This little ship licensed and equipped with airwheels. Price \$900. Will accept good automobile as part payment. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**HEATH HENDERSON:** Deep crankcase, tachometer drive, hillift camshaft, hicompression cylinders, Simms mag.; total time 13 hours. Price \$80, complete with huh. W. A. Lewis, 148 North Birmingham Place, Tulsa, Okla.

**TRAVEL AIR**, J6 five-cylinder. Like new. Has airwheels. Sacrifice at \$2,000; easily worth \$3,000. Newark Air Service, Inc., Newark, N. J. Mulberry 4-3554.

**LE BLOND 85 H.P.**—Time, less than 15 hours, Hamilton metal propeller, N.A.C.A. cowling. Two 20 x 9—4 Goodyear DeLuxe air wheels. All like new. Sell together or separately at bargain price. Lane, 1426 S.W. 7th Street, Miami, Florida.

**185 H.P. CHALLENGER ROBIN**, completely recovered, special deluxe finish; since new 170 hours; licensed until December, 1932; complete hind flying instruments; inertia starter, thermopete, clock, dials, hooster; \$1600. Will take smaller ship in trade. M. G. Seleski, Hadley Airport, New Brunswick, N. J.

**SPECIAL** high speed airplane, powered with Packard aviation engine, steel propeller, Bendix brakes. Also spare Packard engine, J5 and Hisso starters. Take small ship or motors in trade. Box 1457, Tampa, Florida.

**1930 LICENSED OX-5 American Eagle**, perfect, with free Private Pilot's course, \$675. 1928 American Eagle, good condition, with free instruction, \$350. OX-5 American Eagle, wheels, lower \$75, upper \$50. New J5 C-3 metal props, \$75. Free delivery on ships. AERO DIGEST, Box 1270.

**FOR SALE:** Command-Aire Trainer, O-X5. Licensed, perfect, \$775. Deacon, Box 143, Lake Worth, Florida.

**TRAVELAIR 2000**, OX5 Millerized overhead, excellent condition, never crashed, private, just re-licensed, always hangared, \$750. Might trade. OX5 propeller, Supreme, metal-tipped, spinner, not cracked, \$15.00. Grinnell, 311 Kenilworth, Toledo, Ohio.

**STINSON JUNIOR BARGAIN:** 165 Wright, licensed, never cracked, motor like new. Looks and performs mighty good, \$1900. Quick sale, H. T. Dawkins, care of Bry's, Memphis, Tennessee.

**TRAVEL AIR**, J6 five-cylinder. Perfect condition. A wonderful buy at \$1,800. Worth \$2,500. Newark Air Service, Inc., Newark, N. J. Mulberry 4-3554.

**OX-5 CHALLENGER**, licensed, good condition, \$675. Brand new OX-5, \$150. Bargains in new and used supplies. Write for list. Hite & Moore, Bristol, Penna.

**STANDARD J-5**, licensed. Steel prop, tail wheel, brakes. Only 50 hours on motor. Perfect condition. Price \$3,000. Northeastern Air Service, Bridgeport, Conn.

**STINSON JUNIOR**, Lycoming, de luxe equipped late model; will sacrifice for \$2950. Like new, 93 hours, complete instrument equipment; compass, turn-bank rate of climb, air speed; retractable landing lights, navigation lights; speed ring, electric starter, semi-ballon tires, brakes, special leather upholstery, special black and aluminum finish. Licensed to January 1933, privately owned and need the money. Edward Becker, 254 Niagara Falls Boulevard, Buffalo, N. Y.

**WACO** cabin demonstrator, perfect, \$3900. Three OX5 motors, \$125 each; one with complete overhaul. New York Aircraft Distributors, Inc., Floyd Bennett Field, Brooklyn, N. Y.

**USED AIRPLANES**, bargain prices. Licensed, perfect condition. Great Lakes, Eaglerocks, Spartan, Wacos, Fleets. Write for list and specify kind wanted. Aircraft Brokerage & Finance Co., Room 200, 205 West Wacker Drive, Chicago, Illinois.

**EAGLEROCK, OX**, \$775. Year old, 147 hours; refinished, licensed, in first class condition. Want cash. Frank Hoffman, 240 West Utica St., Buffalo, N. Y.

**EAGLEROCK**, new condition, Hisso 180, only 45 hours. Special color, all instruments, air speed, etc. Licensed to June '32. Best offer above \$1000 takes this ship. No charge for dual time. Becker Flying Service, Inc., Buffalo, N. Y.

**FAIRCHILD KR-21:** 2-place open biplane, Kinner, 200 hours. Metal propeller, brakes, airwheels, turn-bank, other extras. Licensed, privately owned, serviced by owner's mechanic. \$1350. B. Homan, 116 Nassau Street, New York, N. Y.

**NEW LAMBERT 90 MONOCOUE:** Licensed, balloon wheels, brakes, extra instruments. Cost \$3600. Must sell immediately. Best offer over \$2000 takes it. Diamond Airport, 519 West Summit Avenue, San Antonio, Texas.

**WACO 90, OX**, new appearance, \$575. Completely overhauled and refinished; fuselage completely recovered; complete equipment, dual, etc. Free instruction. Licensed until 1933. Want cash. E. J. Becker, 250 Franklin Street, Buffalo, N. Y.

**GREAT LAKES:** Cirrus powered. 200 hours. Excellent condition. Dual controls. Complete set Pioneer instruments; compass, turn and bank, level flight indicator, air speed, navigation pad, fire extinguisher, first aid kit, altimeter, tachometer, oil pressure and temperature gauges; many extra engine parts. Only 40 hours since overhaul. N.C. license. \$1385 cash. AERO DIGEST, Box 1274.

**D. H. 4M-1**, steel, rebuilt, licensed with new Liberty, adjustable steel prop, starter, all instruments. Spares: new Liberty, used Liberties, steel props, starters, tires, struts, wheels, tanks, etc. \$1100 all. Trade for two or three place plane. Deliver plane for expenses. E. Cecil Smith, Tallulah, Louisiana.

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**EAGLEROCK-OXX6**, new ship, \$1050. Only 38 hours, complete instrument equipment; will give dual time, no charge. Becker Flying Service, Inc., Buffalo, N. Y.

**FOR SALE: OXX-6** Travel Air, first class condition and licensed. One Scintilla, one Dixie mag and Booster. J-5 landing gear and wheels. Miller overhead. Will solo buyer, \$950. Miss Edna Gardner, U. S. Naval Hospital, Newport, R. I.

**WACO TEN, OXX-6**, dual; Scintilla magnetos; Hamilton steel propeller; complete instruments and lights. Ship licensed to February 1, 1933. Will give free instructions or paint job, \$800. Frank Steinman, Aero Trades, Roosevelt Field, Garden City, N. Y.

**BRAND NEW J-6-300** in box, sacrifice. OX Waco 10, bargain. Fast D-4000 N.A.C.A. Travel Air Speedwing, like new, sell or trade for late model cabin. Christopher Airplane Service, Wichita, Kansas.

**HAVE VELIE 65 MONOPREP.** Fuselage cracked. Replace fuselage and have licensed ship. Will trade same for Aeronca Motor and small cash difference or will sell same cheap. W. B. Crice, Box 385, Bowie, Texas.

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**PARACHUTES:** Approved type. Seat, back, lap and chest, bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonist furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

(Continued on next page)

# CLASSIFIED ADVERTISEMENTS

## Miscellaneous Products & Equipment For Sale

**DU PONT CELLULOID** for windshields, slightly scratched, \$1.00 per lb. In perfect condition, \$1.25 per lb. State thickness desired. Karl Ort, York, Pa.

**ASSEMBLE** your Corben Baby Ace Sportplane from our complete semi-built kits. All major parts and units are factory built. Send dime for detailed literature. Corben Sportplane Supply, Peru, Indiana.

**THE RAINBOW** two-place sportster monoplane for home builders. Fourth series. Ford "Model A" 41-70 h.p. Performance 80-70-31. Catalogues 15c. Photographs 10c. Cosmos (AD-5) Aircraft, Whitewater, Wisconsin.

**BRAND NEW FIRESTONE 22" x 10"-4"** air balloon wheels, without brakes, 1 3/4" hushing diameter, only \$69.95 per pair. Karl Ort, York, Pa.

**FOR SALE:** OXX-6 Waco 10. Left lower panel and front section of fuselage damaged. First \$125 cash takes it. No letters answered. Crawford E. Law, 109 E. Henry St., Elmira, N. Y.

**CRACKED HISSO EAGLEROCK**, engine, fuselage, tail surfaces, cowling, radiator, center section and many other parts in good condition, all for \$275. Will consider steel prop for J-5 as part payment. J. W. Lytle, Box 263, Bridgeville, Penna.

**FOR TRADE:** One Graham Brothers dump truck, value \$1,000, and one White platform body, Model 20, value \$500. Both are three ton capacity, late models, equipped with pneumatic tires, duals on rear. Will exchange for two or three place plane eligible for license in Massachusetts. Write F. Bertrand, 72 Filbert Street, West Quincy, Mass.

**FELLOWS:** Send \$5 for shop blueprints showing how to build dural fuselages for the most popular sport airplanes such as Heath Parasol, Pietenpol, Ramsey Bathub, Church Midwing, Powell Racer, etc. No welding, no brazing, no riveting, no strap or heavy cast terminals. Save weight. Easy to build. Roman B. Maliszewski, 1606 East Bellevue Place, Milwaukee, Wisconsin.

**WOOD SCREWS,** steel, brass or bronze in most all sizes, also machine screws, offered at exactly half price. What do you need? Karl Ort, York, Penna.

**METAL TIPPED** high efficiency, new production propellers. OX-5, \$27.50 each. Ford A and Lawrence, \$15.00. Chevrolet and Ford T at \$12.50. Heath Henderson, \$9.95. Beautifully designed untipped propellers, 3 to 4 foot lengths, \$4.95. Order direct from this ad or send 25c stamps and receive leather bound "Flying Manual and low down prices on ships, motors and props. Hibbs, Fort Worth, Texas.

**BRAND NEW LAWRENCE** motors. Complete with propellers, spinners. Ideal for sportplanes, ice boats, etc. No fair offers refused. J. Coultas, Conner, Montana.

**ACETATE DOPE,** 98c a gal. Nitrate dope, \$1.38 gal. Flightex Grade A Fabric, 27c a yard. 1020 carbon steel tubing, 5c foot. Brand new Hartzell Kinner prop., \$19.75. Karl Ort, York, Penna.

**\$1.95 BRINGS YOU** postpaid complete set of plans for building open and closed simple place Corben Baby Ace sportplanes. Regular price \$5.80. Limited supply. Corben Sportplane Supply, Peru, Indiana.

**BARGAINS IN MOTORS,** propellers, hubs, for lightplanes, iceboats, snowsleds. Converted Indians, \$35. Fords, Chevrolets, \$50. Propellers, \$5 to \$12; hubs, \$5. Flying Flivvers, new prices. Blueprints, \$5. Circulars, 10c. Storms Aviation Co., Spartanburg, South Carolina.

**FOR SALE:** New Heath tail unit complete. Straight axle landing gear. Want two-place light job, licensed. Cheap for cash. David Stilson, Montrose, Penna.

**USED PARTS** for C-2 Aeronca, Center Section Eaglerock, Model 101 American Eagle plane. Used J-5, J-6, Aeronca E 107 A, Kinner K-5, Velle motor parts at big discount. Real bargains in used planes. Write us your needs. Rapid Air Lines Corporation, Omaha, Nebraska.

**BLUEPRINTS:** Complete working drawings for 160 m.p.h. tiny low wing racer, powered with 63 h.p. inverted, air-cooled engine from Ford A parts. \$2.00. Air-Dale Aircraft, 2320 Isabella St., Evans-ton, Ill.

**FOR SALE:** Finished units for Heath parasol, wings, tail surfaces, fuselage, etc., less than cost of materials, also Heath motor. Chas. Petrie, Kremlin, Montana.

**BUILD** successful two-seater light airplane for \$350.00. Send \$5.00 for complete set of blueprints, including simple Ford "A" conversion. Al Stopes, 105 Hamilton Place, New York City.

**FOR SALE:** One pair sportplane wings complete, less covers. Suitable for Church or Heath. AERO DIGEST, Box 1273.

**ARROW SPORT** crackup, less motor, \$150. Photo 5c. Consider trades. Want Command-Aire wings, Heath Parasol, Instruments. Diamond Airport, 519 West Summit Avenue, San Antonio, Texas.

**HEATH PARASOL,** 1931 model, welded construction, 16 x 4 wheels, Henderson conversion parts and hardwood propellers. Reasonable. List for stamp. Zander, P. O. Box 82, Michigan City, Indiana.

**WE REBUILD OR RECOVER** any make of airplane or parts. Travel Air Waco and Heath parts. Flightex covers for all makes. Roger Mensing, 1218 Jones Street, Fort Wayne, Indiana.

**BRAND NEW 1932 American Eaglet,** Szekely 45 h.p. motor. Cost new \$1575. Sell for \$1275. AERO DIGEST, Box 1272.

## Wanted To Buy Or Trade

**WANTED:** Right lower wing for center section Eaglerock. Also wing and center section struts. Write Clemson College Aero Club, Box 90, Clemson College, South Carolina.

**WANTED:** Floats for Challenger Robin; give all particulars, including year manufactured, manufacturers' number. Price must be reasonable. AERO DIGEST, Box 1263.

**WILL BUY FOR CASH,** if priced right, licensed Bird, Waco, Eaglet, Monocoupe or light cabin ship with Warner, Kinner, Lambert. Carl Hanson, "Airport," Youngstown, Ohio.

**WANTED:** Right priced OX or Kinner Bird or Fleet. State lowest price for quick cash sale in first letter. Must be exceptionally good buy. R. A. Van DeVerre, Municipal Airport, South Bend, Indiana.

**WILL TRADE** \$3500 equity six-room duplex, four-room furnished house on same lot, good rental property, close in; for two or three place air-cooled job. I. U. Patterson, 1239 S. Gary Place, Tulsa, Okla.

**HAVE \$500** for licensed plane. What have you? Coffman, 524 Thurman St., Saginaw, Mich.

**WANTED:** N.C. job; Waco F Warner; Bird-Warner or Fleet Trainer. Priced under \$1500. Give history. Terms. M. R. Herrmann, 211 Lyceum Building, Duluth, Minn.

**WILL TRADE** 1928 Auburn sedan, equipped with radio, for a good ship. Write. All letters will be answered. William Adams, 11 East 16th St., Chicago Illinois.

**WANTED:** Three wings for Waco 10-OX-5. Both lower and left upper less ailerons, covered or uncovered; must be eligible for license and cheap for cash. Archie Hurd, 407 Otterview Avenue, Roanoke, Va.

**WILL TRADE** Curtiss "MF" flying boat, excellent condition, for recognized light plane in good condition, or will sell outright. Lieut. J. N. Zeller, Coast Guard Base, Stapleton, Staten Island, N. Y.

**HAVE V-63** Cadillac, custom sedan. Excellent shape, 34,000 miles. Cost me \$5,000. Will trade for good three-place airplane. Must be licensed, C. J. Moore, Ranger, Texas.

**WANTED:** Two- or three-place licensed air-cooled airplane. Have \$600 cash. State guaranteed condition with photo. Pilot, 16223 Whitlock, Detroit, Michigan. Phone Oregon 1229.

**WANTED:** Right wing for Robin. Must be uninjured and in licensable condition and priced reasonably. Uncovered preferred. Box E, Hashrouck Heights, N. J.

**WANTED:** Radial single engine licensed plane, open or preferably closed, in trade for a 1929 Studebaker Commander Sedan having few miles, winter front, hot water heater and numerous extras. Write Box 191, Antigo, Wisconsin.

**TRADE** late 1930 Special Packard Eight Sport Phaeton for two or three place late production ship with radial or in line motor. Roy Calkins, National Supply Co., Houston, Texas.

## Patents and Inventions

**INVENTOR'S UNIVERSAL EDUCATOR.** Contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., 602-C, Ouray Building, Washington, D. C.

**PARTY TO FINANCE PATENT** application; invention of a variable pitch propeller. Different, practical. William Hobbs, 213 South 29th St., East St. Louis, Illinois.

**FREE, PROMPT PERSONAL ANSWERS** on patenting new inventions. Sterling Buck, 25 years Registered Patent Attorney. No invention too complex or too simple. A-629 F St., N. W., Washington, D. C.

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**T**HE readers of this magazine are enthusiastic readers. Not a page misses them. They start at the front cover and read through to the last. Many of them are engaged in the aviation business—in its various branches—or own their own planes for sport or business purposes. A number of them are potential plane owners. They represent a good market for aviation products—these AERO DIGEST readers—the largest you can reach with advertising. If you have something aeronautical to sell, use the DIGEST. It pays well. Forms for March close February 19th.

Watertown, Mass.  
January 11, 1932

Aero Digest  
220 W. 42nd St.  
New York, N. Y.  
Gentlemen:

Enclosed find a check for five dollars, to cover the bill for my two year subscription to Aero Digest.

Is there any possibility of any future number of Aero Digest containing an article on military planes, by Paul Lamarche?

Your publication is the best aeronautical magazine I have ever read and I have read every aeronautical magazine published.

Yours truly,

(Name on request)

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**Positions Wanted**

**FILIPINO**, age 22, high school education, fluent in English and Spanish, 25 hours flying time, graduate mechanic course in government approved school, willing worker, will go anywhere. Jorge Codina, 837 N. La Salle St., Chicago, Illinois.

**LICENSED MECHANIC** with three years Army experience wishes position. Will go anywhere. J. W. Hein, Redmond, Oregon.

**NEAT LOOKING, CAPABLE** young salesman, experienced in large transactions, is intending to change his position this spring or sooner. Age 33. Represented a large Wisconsin fur stock corporation for the last five years in all foreign countries. Speaks three different languages; is looking for similar position to represent a first class airplane corporation. Further information will be given to a reliable company. Write Box 605, New London, Wisconsin.

**AIR MAIL** and passenger line pilot desires good connection. Age 33. 3000 hours, day and night. Trimotor and single motor cabin ratings. Working knowledge of Spanish, two years flying mail in Central and South America. Sales experience. Willing to go anywhere. AERO DIGEST, Box 1256.

**L. C. PILOT**, Ludington trained, perfect references, single, accredited Military Academy graduate, experienced in open and cabin ships; will travel. AERO DIGEST, Box 1257.

**TRANSPORT PILOT**: 700 hours instruction, barnstorming, taxi, airport manager, open and cabin flying. Age 25. Good character. No tobacco or liquor. Go anywhere. Wire or write Box 30, Buhl, Minnesota.

**YOUNG MAN**, 19, trained in airplane and engine mechanics, also welding, wishes starting position in industry. Vincent Alekna, 827 West 18th Street, Chicago, Illinois.

**TRANSPORT PILOT**, 3,000 hours day and night airline flying, capable instructor, will consider any proposition. Pilot, 700 Walnut St., Blytheville, Arkansas.

**YOUNG MAN**, single, wants starting position connected with aviation. Three semesters college mechanical engineering. Go anywhere. References. Claude Trenary, Route 4, Harrington, Delaware.

**TRANSPORT PILOT**, experienced in all branches, now available. Formerly associated with well known organization. References. Single, will go anywhere, this country or others. College and business experience. AERO DIGEST, Box 1264.

**L. C. PILOT**, age 20, graduate Spartan School; very anxious to enter commercial aviation. Will accept any position offering opportunity for advancement. Clifford C. Jacobs, 410 N. First St., Marshalltown, Iowa.

**YOUNG MAN**: Will work one year for expenses only, in return for L. C. flying course. 21, high school and Aviation Institute graduate. Excellent references. Curtis Walsh, Ruffin, North Carolina.

**AIRPLANE DESIGNER**: Five years design and stress analysis, with large commercial manufacturer. Temporary or permanent work on stress analysis or design. AERO DIGEST, Box 1269.

**TRANSPORT PILOT**, mechanic, 550 hours safe, sensible flying on all types, Standard to Stinson. Instruction, cross country, barnstorming, airline experience. All weather, some night flying experience. No crack-ups. Best references. Age 24, single. Steady employment more important than large salary. Go anywhere and fly anything licensed. Robert M. Norris, Marquette, Kansas.

**STUDENT ENGINEER** desires position offering future with reliable aircraft organization. Ferris E. Alger, 5091 Delmar Blvd., St. Louis, Mo.

**DRAFTSMAN**: 29 years old; five and a half years' experience as airplane mechanic in Norwegian navy; college educated, five years' experience on drawing board. Wishes position in airplane industry. O. H. Roed, P. O. Box 1181, East Chicago, Indiana.

**L. C. PILOT** with A. & E. mechanic's license. Also good welder. Will consider any proposition. Go anywhere. Urban Lowden, Hangar 7, Love Field, Dallas, Texas.

**YOUNG DANE**, 19, wishes position with barnstormer as helper. Will do parachute jumps. Write Jens P. Johansen, Box 178, New Paltz, N. Y.

**Miscellaneous Services Opportunities, Offers, etc.**

**AGENTS, MECHANICS SOAP**. Cleans greasy hands immediately. Dozen cans, \$1.50. Mechanics Soap Co., 1610 Knapp, St. Louis, Missouri.

**A FEW** slightly shopworn ornamental World War propellers left, for only \$1.98 each. Send \$1.00 additional if desired refinished. Karl Ort, York, Pa.

**LEARN TO FLY**: Receive flying instruction at a large reduction after completing our home study course on aviation. Inquire Adrian Flying Service, Adrian, Michigan.

**OPPORTUNITY** offered one young man to earn mechanic's and transport pilot's license. Small investment required. Must be able to furnish A-1 references. If serious, write Transport, Box 92, Sheridan, Calif.

**MAGNETOS, ALTIMETERS, TACHOMETERS, Turn Indicators**, etc. Expert repairing and testing of any instruments. Repair estimates if desired. Government licensed mechanics. Streed Electric Co., 1312 Harmon Place, Minneapolis, Minn.

**SEND DIME** for latest catalog of aircraft materials, parts, engines, propellers, etc. Buy from Ort. Save money. Write today to: Karl Ort, York, Penna.

**\$6000 EQUITY** in modern home, suburb of New York, in exchange for planes, aeronautical stock, or interest in promising aviation or allied business. AERO DIGEST, Box 1262.

**NEW YORK FLYING CLUB** offers a complete flying course of 10 hours for only \$100. AERO DIGEST, Box 1238.

**TRANSPORT PILOT**, also A & E licenses, with long all-around aircraft experience, wishes connection to operate airport, or to hear from party now operating airport who wants partner. Have excellent training plane, other equipment. AERO DIGEST, Box 1271.

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 MANUFACTURER OF PROGRESSIVE AIRCRAFT FINISHES • MEMBER AERONAUTICAL CHAMBER OF COMMERCE
 

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HERE'S AN  
**ACID-PROOF**  
**BLACK**  
 that will dry

Berry Brothers announces the development of a *quick drying, acid-proof Black* that positively ends production difficulties heretofore encountered with finishes of this type. It sprays or brushes—air dries or bakes. In five hours it air dries to touch. Overnight it dries hard. Acid and salt spray cannot injure this finish which was primarily developed as a protective coat for the interior and exterior surfaces of battery con-



tainers. In aircraft construction it is ideally suited for finishing all of the structural members and parts used in the fabrication of the area surrounding the battery. We know of no finish of this type more impervious to injury, more durable or quicker drying than this important new Black. Get the facts. Write for complete information or ask our Aviation Division to send an experienced representative.

---

**B E R R Y      B R O T H E R S**  
 VARNISHES      •      ENAMELS      •      LACQUERS  
 DETROIT, MICHIGAN      WALKERVILLE, ONTARIO

# O.K. GIVE HER THE GUN!



● Revs all right—magnetos all right—*oil* all right—then give her the gun!

● Check Mobiloil Aero Oil before you start—you'll find it circulates promptly — makes starting easy.

● Check Mobiloil after hours of high-speed flying—you'll find it's holding pressure.

● Mobiloil Aero Oils have an unusually *flat* viscosity curve—you get the "double-range" service of easy starting in a cold engine and rich, full lubrication when you rev her up.

● Mobiloil Aero Oils have Slight oxidation reading of *Zero* — they have conquered oil gumming and sludging.

● Mobiloil Aero Oils can give you more hours per quart. Ask for these oils at any established airport.

VACUUM OIL COMPANY, INC.

# Mobiloil **AERO** OILS stand up

FOR ROCKER-ARM LUBRICATION USE MOBILGREASE



## WHEN STANAVO FLIES

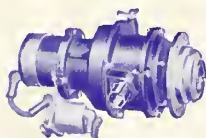
Five transcontinental flights, a 6000 mile tour of Europe, a record trip from New York to Buenos Aires, visits to every important airport in the United States and South America — these "high spots" the astonishing record of the famous Stanavo "Flying Trade Mark," the Lockheed Vega ship of the Stanavo Specification Board, Inc.

When this great eagle flies, Eclipse Aviation Products function smoothly, surely.

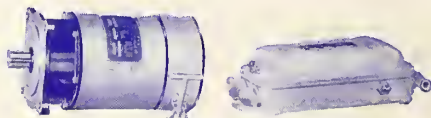
In Northern cold and tropic heat; through snow, sleet, torrential rain; over the Rockies, Alps, Apennines, Andes; over land and ocean—always the Eclipse Starter and Eclipse Generator have performed as expected, have proved their reliability.

### ECLIPSE AVIATION CORPORATION

East Orange, N. J. (Subsidiary of Bendix Aviation Corporation)

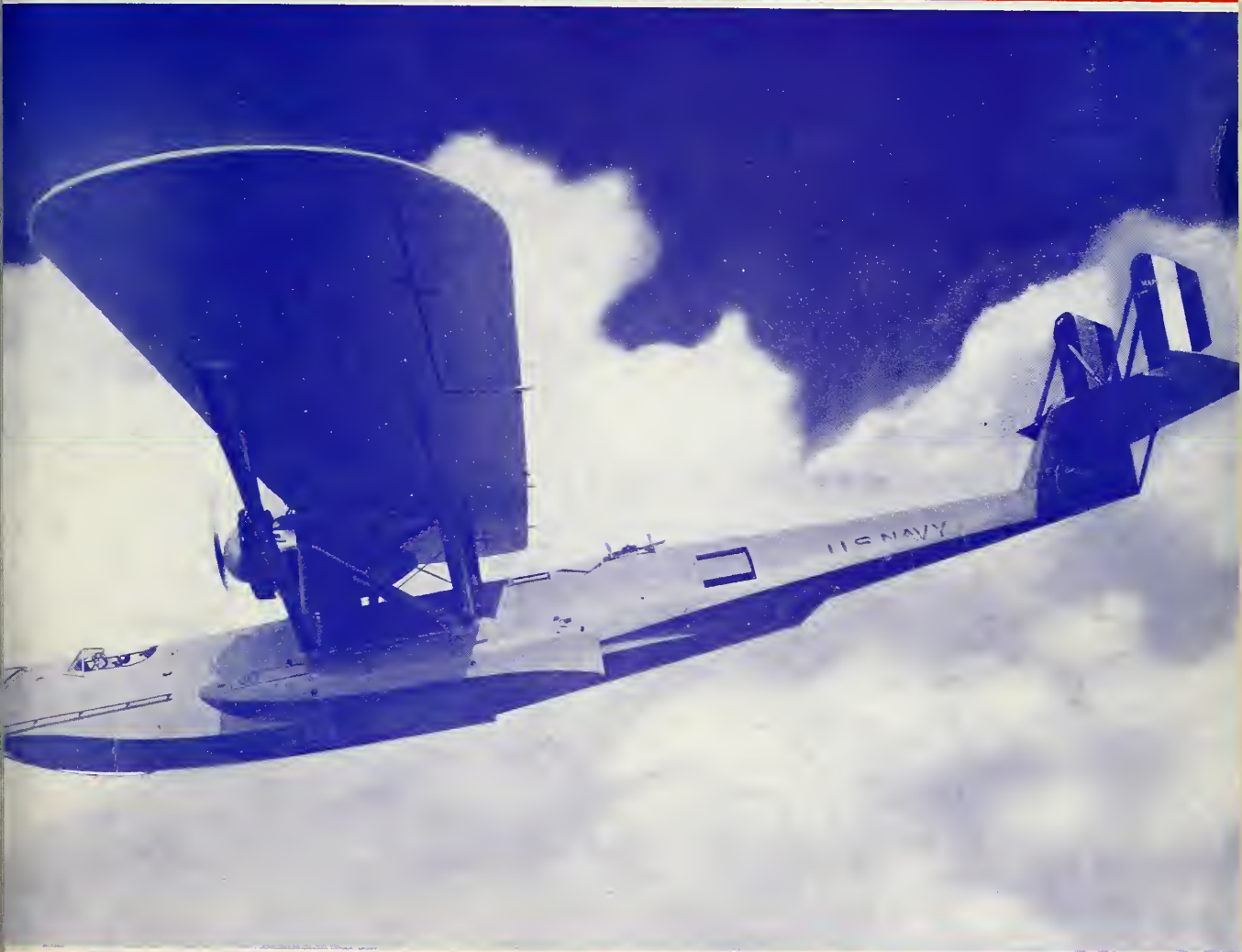


Eclipse Series 6, Combination Hand and Electric Inertia Starter with Solenoid Switch. Concentric type for radial engines up to 1350 cu. in. piston displacement. Also obtainable without electrical attachment, for manual operation.



Eclipse Voltage-Regulated Generator, 15 volt, 15 ampere capacity, engine drive type with control box.

# AERO DIGEST



## Minimum Requirements for Military Aviation

Maj. Gen. James E. Fechet, U. S. Army (Ret.)

High Temperature  
Aircraft Engines

Arthur Nutt

Flight  
Surgeon

Lt. Col. G. I. Jones

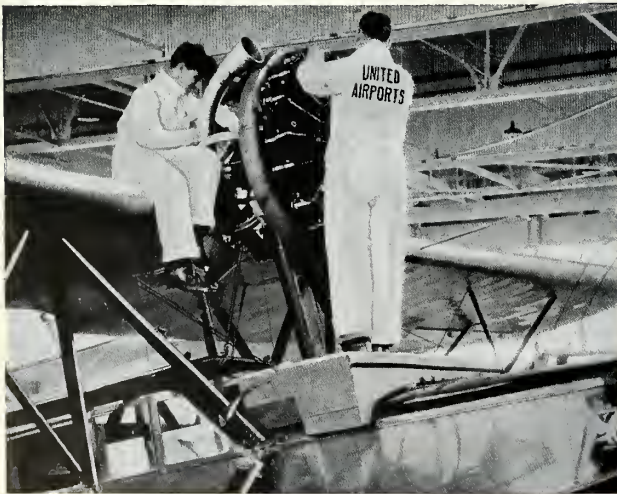
Graphical Solution  
of Wing Beams

Dr. M. Watter

# Dependable Maintenance

for

# Wasp & Hornet Dependability

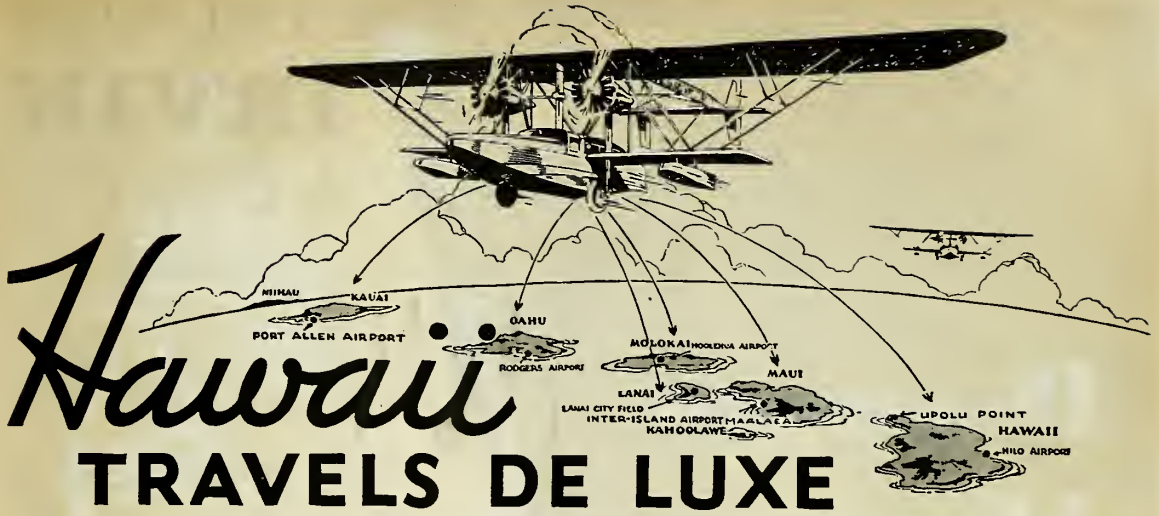


Every owner and operator of a Wasp or Hornet engine is a preferred Pratt & Whitney client, receiving the keen interest of the manufacturer and the unceasing cooperation of his representatives. At each of the twenty-eight Pratt & Whitney Authorized Parts and Service Dealers he finds a devotion to craftsmanship inspired by intimate familiarity with the methods of original manufacture. He finds complete parts in stock. And he finds the sort of inspection and maintenance service which amply justify his instinctive association of three words: *Wasp, Hornet and dependability.*



THE  
**PRATT & WHITNEY AIRCRAFT CO.**  
EAST HARTFORD . . . CONNECTICUT, U. S. A.  
Division of United Aircraft & Transport Corporation  
Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec; in Germany by Bavarian Motor Works, Munich; and in Japan by Nakajima Aircraft Works, Tokyo.





Stanavo-fueled planes of Inter-Island Airways link all Hawaii with a regular monthly flying schedule of 23,000 miles.

The unique, well-established and efficient service of Inter-Island Airways is no less popular among the people of Hawaii than among tourists. Organized but two years ago, its four amphibions and one single-motored

cabin monoplane have carried over 25,000 passengers 600,000 miles. Its schedules have been maintained with practically one hundred per cent regularity.

Like many other lines in the Americas, Europe, and elsewhere, Inter-Island Airways finds Stanavo Aviation Gasoline best suited to its requirements, and uses it exclusively.



# STANAVO

## AVIATION GASOLINE AND ENGINE OIL

STANAVO SPECIFICATION BOARD, Inc.  
*Organized and Maintained by*

Standard Oil Company of California  
225 Bush St., San Francisco

Standard Oil Company (Indiana)  
910 So. Michigan Ave., Chicago

Standard Oil Company of New Jersey  
26 Broadway, New York City

You Can Trust  
**IRVIN**  
 --the World Does!

This time, it's Australia.

Here the camera has caught Lieut. Reece of the Royal Australian Air Force—a split second—after he has pulled the rip cord of his "IRVIN," over the Melbourne Aerodrome.

Note the pilot chute. How—*instantly*—it has sprung into action. How—*instantly*—it holds the apex of the main Chute out into the line of flight, as Lieut. Reece moves away from the ship he has just left, thus absolutely assuring the proper deployment of the canopy.

In another instant—the canopy will be fully inflated. Lieut. Reece will be floating gently—safely—to earth.

#### THE PILOT CHUTE

—product of IRVIN Engineering, pioneered by IRVIN research, is just one of the outstanding contributions to aerial life-saving that has made IRVIN'S unapproachable record of more than 500 lives rescued in mid-air. That has given flying the sureness of safety even in the direst of unforeseen emergencies.

Every IRVIN Air Chute comes from this same distinguished lineage. Into it is built the far more than a decade of this world-wide flying and life-saving experience. Back of it is the engineering and inventive skill of a group of pioneers in parachute development devoting their efforts exclusively to producing the safest parachute possible to build.

Thus has IRVIN become the Standard Life-Saving Equipment for the Air Forces of the United States, Great Britain and 28 other governments.

Trust IRVIN—the World Does!

Address Our Nearest Office

**IRVING AIR CHUTE CO., Inc.**

Main Office and Factory  
 372 Pearl St., Buffalo, N. Y.

More Than

**500**

Lives Saved

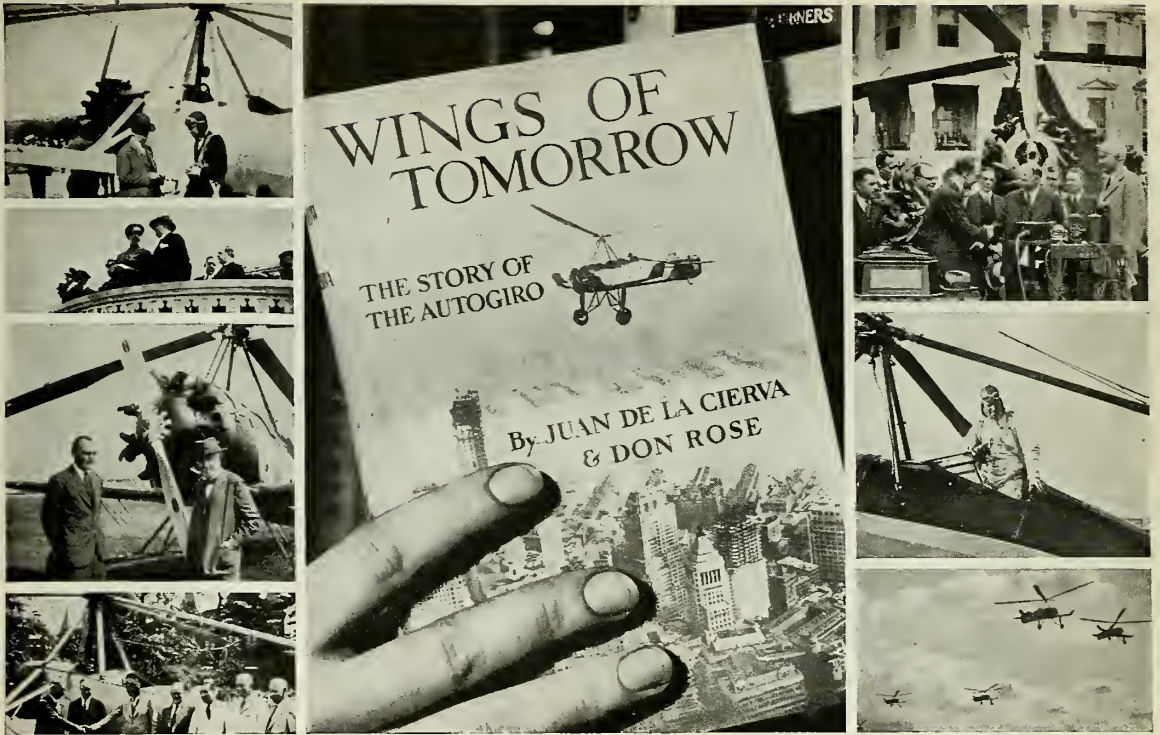
WEST COAST Factory and Office: 1500 Flower St., Glendale, Calif.  
 CANADIAN Factory: Ft. Erie, Ont.

BRITISH Factory: Letchworth, Herts, England



1021

**IRVIN AIR CHUTES**  
 "The Life-Preserver of the Air"



© Wide World Photos, Acme, Underwood & Underwood.

# A GRAND BOOK TO READ

*"A rare combination of engineering brains and literary skill . . ."*

QUOTATIONS from critics only serve to prove what thousands of enthusiastic readers all over the country have found—that "Wings of Tomorrow" is not only an absorbing story, but an historic reference work that deserves a permanent place in any library.

Written by the noted inventor, Juan de la Cierva, himself, "this story of the Autogiro is indeed a romance of the machine age, written by the man who knows it from the beginning, the man who invented it, first built it and first made it fly." (S.A.E. Journal, Sept., 1931).

"If you want to know all about the Autogiro, how it is made and how it performs, here's the book for you, and we hope you'll find it as fascinating as we did," comes from Judge, July 4, 1931.

And from the U. S. Air Services, August, 1931: "What Senor Cierva has done in this work suggests irresistibly what should be done—should have been done long ago — by a famous contemporary, Orville Wright."

**The Giro Book Company**  
1829 LAND TITLE BUILDING, PHILADELPHIA, PA.

These are but a few samples of the reviews this book has received. They are all alike in meaning if not in words—that "Wings of Tomorrow" is a grand book to read, a remarkably accurate reference work, and a volume of permanent worth which will increase in value with every year—it is 284 pages long, with many interesting illustrations.

Fill out and return the coupon, and if after you receive the book you are not entirely satisfied, your payment will be promptly refunded.

RETURN THIS COUPON

**The Giro Book Company**

1829 Land Title Building, Philadelphia, Pa.

Gentlemen:

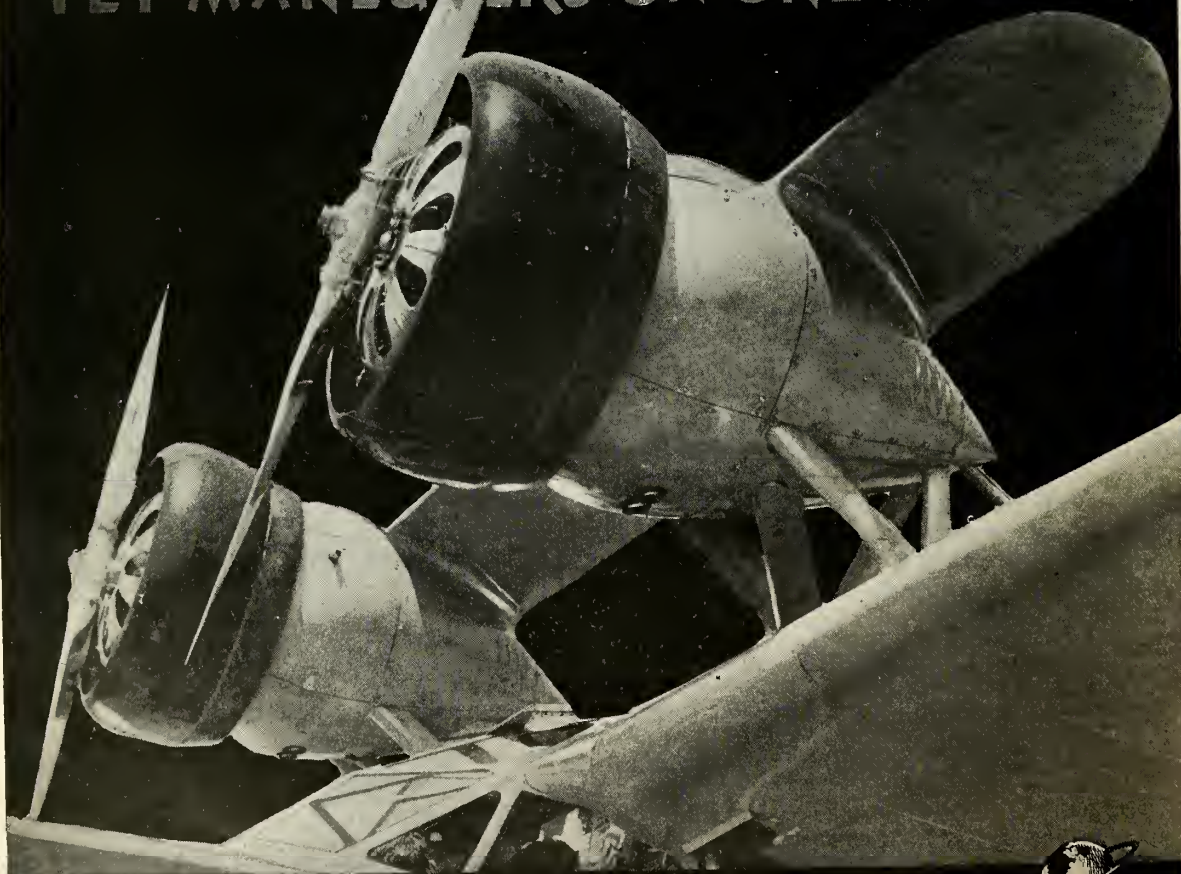
In consideration of the enclosed  check  money order for \$2.50, you may send me on approval, postpaid, one copy of "Wings of Tomorrow."

Name .....

Street Address .....

City or Town ..... State .....

600 H.P. PLUS  
FLYS ONE TON  
PAYLOAD  
YET MANEUVERS ON ONE MOTOR



*Amphibion* **DOUGLAS**



DOUGLAS AIRCRAFT COMPANY, INC. SANTA MONICA, CALIFORNIA



# Who's this — another JIM HILL?

DO you know a young man whose outlook is entirely upward . . . whose face lights up when he hears an airliner pass overhead and whose talk is all of powerplants, pay loads and passenger schedules.

*He may be another Jim Hill . . . an Empire Builder of the air.*

Somewhere in this country today are perhaps a dozen boys who will be the great air-transportation executives of the century. They are to shape the

systems which will dominate our flying commerce twenty years hence. Their vision is already nationwide, intercontinental, indeed. They dream things you can only guess at . . . and their dreams are coming true.

You are fortunate if you know one of tomorrow's aviation executives. If you are closer than that . . . if it is your privilege to help him prepare himself for success . . . you owe him the benefit of your best judgment in the choice of a school.



## Educate him for LEADERSHIP in Aviation!

He deserves professional training of the highest caliber obtainable, under men who realize that *character* is the first and greatest factor in all achievement. He needs a school where aviation is regarded as a business . . . *as this century's greatest business, indeed.* This young Jim Hill will find what he wants in PARKS' Executive Transport Pilot's Course . . . two years of work which is equivalent in its field to four years of college preparation for other professions. It gives complete transport-training *plus* 28 weeks of executive business instruction planned for the man with the business point of view toward aviation. It is a course from which will come some of tomorrow's great air transportation leaders . . . and your young Jim Hill may be one of them. You owe him the chance to prove it.

*You are invited to visit and inspect* **PARKS AIR COLLEGE**

### PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Section 3 AD  
East St. Louis, Illinois

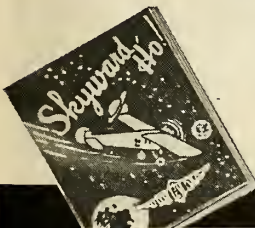
Send me "Skyward Ho!", with information about the course checked, for a young man of (Age) \_\_\_\_\_

- Executive Aviation Course (28 weeks)
- Executive Transport Pilots' Course (2 years)
- Other Flight and Mechanics Courses

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

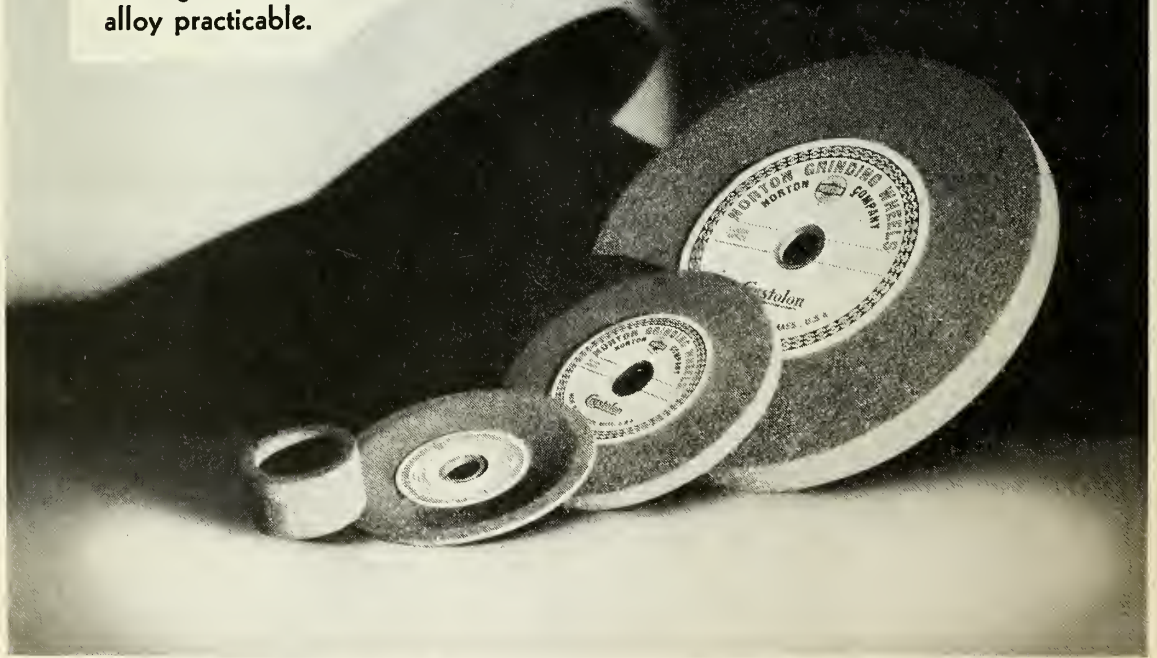


If you cannot come to the school, this book will tell you much about PARKS standards and methods. It describes all our courses in detail, with many illustrations. Sent on request.

**MAIL THIS COUPON**

A New Cutting Metal . . Super-hard  
Then **Wheels to Grind It**

**S**TEEL makers brought out a new alloy—tungsten carbide—a metal so hard that it machines high speed steels at almost unbelievable rates . . . so hard that it machines glass, porcelain and other materials unworkable before. But to be usable, tungsten carbide tools must be shaped and sharpened . . . and resharpened. Norton developed wheels to grind it—specially structured wheels of Crystolon abrasive—again keeping pace with the metallurgist, making another new alloy practicable.



**NORTON COMPANY, WORCESTER, MASS.** — Grinding and Lapping Machines • Grinding Wheels, Abrasives, Pulpstones, India Oilstones • Laboratory Ware, Refractories, Porous Plates • Non-slip Tiles, Treads and Aggregates

**NORTON**

# WHERE IS YOUR MARKET?

How many men do you know who can afford to own a wife, an automobile AND an airplane? They are your prospects! How many of these HOT prospects are under 40? How many airplanes are available at a reasonable price, that they can learn to fly quickly and safely and will enjoy owning?

## THE N-B TRAINER!

READ WHAT A NATIONALLY-KNOWN SPORTSMAN SAYS ABOUT IT →

TOP SPEED WELL OVER 100 M.P.H.  
LANDINGS IN 300 FOOT FIELDS.  
COST OF OPERATION LESS THAN THE LOWEST PRICED AUTO.  
FREEDOM FROM TRAFFIC, AND AN INSPIRING, CLEAN SPORT.

at  
**\$1990**  
f. a. f.



HAVE YOU SEEN THE "TRAINER BONNET"? YOU MAY WANT A CLOSED SHIP. YOU CAN HAVE IT IN THE "TRAINER" AT ONLY \$150 INSTALLED.

535 PALACE AVENUE  
SANTA FE, NEW MEXICO

Dec 5

Jack Whitaker  
Sales Manager  
Nicholas-Beazley Airplane Co, Inc

Dear Jack:

In spite of my extreme youth (60 next July - have to admit it!) I have had no end of fun with the Trainer and find out altitude of 7000 ft no handicap. Funny but I am actually timid when I fly another ship and yet feel perfectly confident and at home in the N.B. 8. I believe I'll christen it "The Old mans delight".

Better come out and let me take you over our mountain's

Warm Regards  
Ashley Pond

← THIS IS MR. ASHLEY POND BESIDE HIS N-B TRAINER. ONE OF A HALF HUNDRED MATURE, MODERN AMERICANS WHO ARE FINDING REAL PLEASURE IN FLYING THEIR N-B TRAINERS.

WRITE ABOUT YOUR SHIP

WRITE ABOUT DEALERSHIP

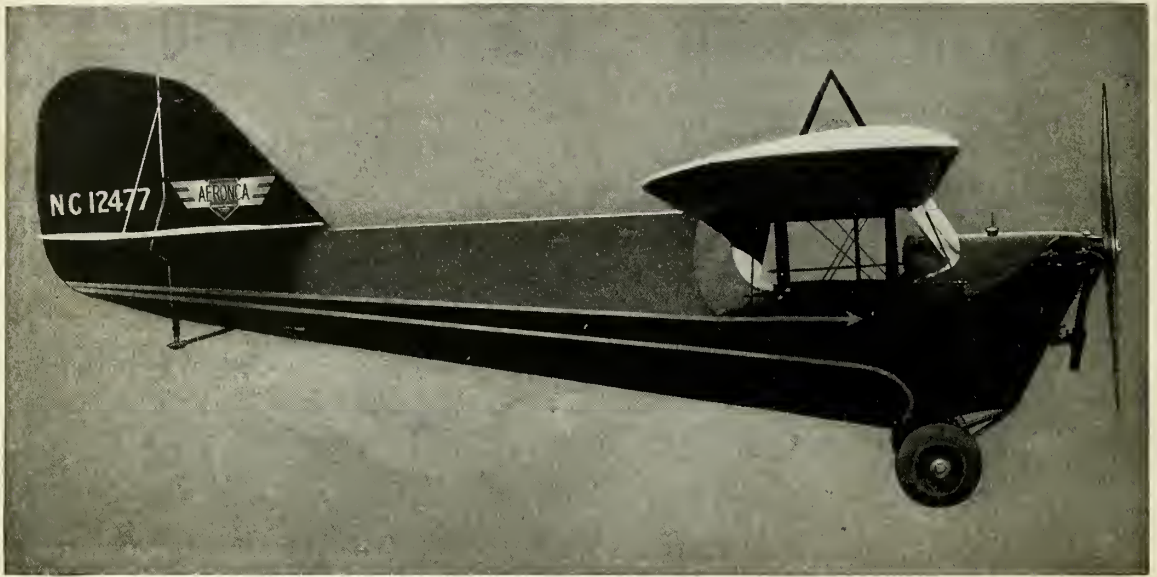
**NICHOLAS-BEAZLEY**  
MARSHALL



EST. 1921

**AIRPLANE CO., Inc.**  
MISSOURI

"We don't believe in kidding the public!"



## A frank statement about the 1932 light airplane situation.....

ABOUT the middle of last October, after two and one-half hours' flight training and ten hours of solo practice, I decided to sit behind an Aeronca control stick for 20,000 miles to get some first-hand information on the light airplane situation in general . . . and the reaction to Aeroncas in particular. I returned from the trip last week . . . with over 300 hours in my log book . . . and a genuine conviction that any light plane prospect—whether private owner or dealer—owes it to himself to insist on positive proof of safety, real economy and month-after-month reliability before signing on the dotted line. In other words, the past record of any airplane is a much better measure of its real value than a lot of glamorous advertising verbiage or highly spectacular, but meaningless, circus-type flight demonstration.

We have been in the light airplane business a long time. The Aeronca was actually born some seven years ago. It underwent a five-year development period before it was ever marketed . . . as this corporation is highly

adverse to making test-pilots out of innocent purchasers. We pioneered straight down the line . . . and take the credit for starting the trend which has put flying within the reach of the average man. Many Aeroncas have been purchased . . . by many varieties of buyers, for many varieties of uses . . . and every ship and owner is a glowing testimonial of the fact that we have never "kidded" the public. In short, we have built an honest product, made honest claims for it . . . and are today beginning to reap the reward which is the natural result of giving people honest value for their money. That 20,000 mile trip convinced me of that!

**SAFETY**—The three prime requisites of any worthwhile airplane built for the average man are safety, economy and reliability. If you really have this combination, you'll get complete satisfaction as a private owner or worthwhile profits as an aggressive operator. Of the three, safety is the paramount necessity because human life is priceless. You most certainly do not want to risk your own neck in something that starts spinning at the slightest provocation, nor would you care to be implicated in the death of some student novice just beginning to sprout ambitious wings. Aeroncas have this safety—because years of intelligent engineering and creative thought have discovered the combination of factors which make a fatal crash a most distinct improbability. Inherent stability is so much a part of the Aeronca that a man would darn near have to lose his mind before he could crash. Hands-off flying is something we ceased



bragging about long ago. We take our ships off day after day without touching a control . . . make perfect turns with stick or rudder alone . . . execute "autogiro" landings as a matter of routine. Ye gods! that's old stuff with Aeroncas. We've been doing it for years . . . and nobody's ever been hurt trying it.

**ECONOMY**—There's only one sensible way to figure economy: How much does a ship cost per hour of flying time. To get this figure you must have actual proof of the life of the plane and motor, maintenance, fuel cost per hour and the initial price. Any other method of figuring is misleading because depreciation exceeds fuel costs in light planes. Aeroncas are good for 1500 hours and won't use 75c worth of gas and oil an hour. In 20,000 miles my average cost was less than 1c per mile and my repairs were exactly nothing.

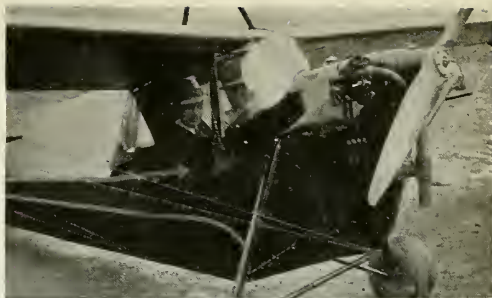
**RELIABILITY**—The absolute dominance which Aeroncas have attained in the matter of reliability is traceable partly to the excellent design and construction of the plane itself, but more particularly to the superior performance obtained in Aeronca Motors. Most light airplanes have a certain amount of inherent stability; most of them are easy to fly; most of them land at relatively low speeds . . . but only Aeronca planes proved themselves capable of withstanding day-after-day usage in training schools, cross-country work and private owner flying . . . a fact attributable entirely to the excellent quality of Aeronca motors. The Aeronca was the only light plane to complete the National Air Tour and the Santa Monica-to-Cleveland Derby. Aeroncas won eleven places at the National Air Races. They have made numerous trans-continental flights . . . at ridiculously low costs. I, myself, a 33-year old novice, blissfully sat behind the stick of NC 11495 while it faithfully carried me over 20,000 miles of mountains, forests, lakes, swamps and vast prairies in all kinds of weather . . . without missing a lick. No wonder Aeronca owners, everywhere, are our biggest boosters!

**PROFITS**—The Aeronca was the biggest money-maker in the industry in 1931. J. H. Wentworth of Miami, for instance, sent in orders with such pleasurable regularity that I flew the Everglades twice to see how he did it. The secret was two Aeronca training schools through which he earned about \$1000.00 monthly and developed enough private pilots to actually sell a dozen ships in nine months. And, out in Texas, there was Ed Ritchey, who bought a ship that had flown 17,000 miles on demonstration trips. Since last July, he's had a net profit of \$250.00 to \$400.00 each month . . . after paying himself a salary and charging off depreciation and all expenses. He's the only operator in Fort Worth who did earn any money. Rasmussen, in Portland, Oregon, even charged interest on his investment besides gas, oil, hangar, repairs, insurance, mechanic, etc., and took in \$8.00 per hour for 586 hours at a cost of \$1416.13 . . . a profit of \$3272.00 . . . 200% on his investment in 7 months. These are not *claims* . . . they are cold facts. Can anyone else show you similar figures?

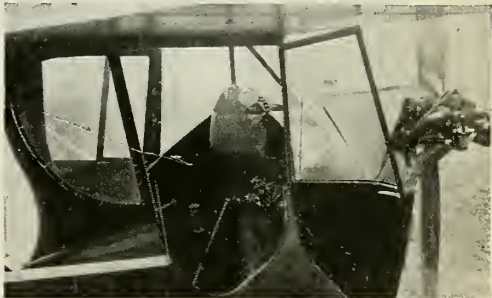
1932—We have three wonderful improvements this year. We didn't shout about them until we were sure they were right. But, they're ready now. The winter enclosure is a knock-out. A new type head makes that motor even more satisfactory and that oleo-gear absolutely clinches my statement that Aeroncas are farther ahead than at any time since we started to pioneer this light airplane field. I've just touched on some things here . . . but the factory will give you the full story for the asking. You owe it to yourself to write today . . . if you want real value for your money.

SIGNED

*A. Eichelhammer*  
SALES MANAGER



*The Winter Enclosure makes the Aeronca unbelievably comfortable, adds materially to its appearance, and opens up a much wider private owner market. School operators find it adds greatly to the number of hours sold during the winter season.*



*The Winter Enclosure is a two-door affair easily removable for summer flying. It is fitted to the standard Aeronca without any change in the existing structure, thus providing optional open or closed plane features.*



*There are scores of Aeronca Schools all over the country, all of them earning big dividends for the operators because they bring the cost of training down to \$10.00 dual and \$7.00 solo . . . and still pay 60% profit.*



*Our experimental school at the factory has furnished us with a wealth of definite data on costs, methods of operation, typical advertising campaigns, etc. This information will help you get started. It's free for the asking.*

THE AERONAUTICAL CORPORATION OF AMERICA

===== LUNKEN AIRPORT

CINCINNATI, OHIO =====



# LOWEST PRICE IN HISTORY



The Davis D1-K

## \$2295 WITH KINNER K-5

**H**ERE'S a favorite—at the lowest price ever quoted. The same standard of quality and specifications as used when this identical model sold for \$4295. Davis Monoplanes have proved their claim to the best performance in their class. Economy and speed for the business man and sportsman pilot. Training plane stability for the student pilot.

The D1-K DeLuxe includes exhaust ring, Aerol shock struts, Aircraft Products wheels with 6.50 x 10 semi-balloon tires, air speed, compass, front cockpit enclosure, tunnel type windshield, rear cockpit shields—for \$2595. Aircraft Products wheels with brakes and semi-balloon tires, \$175 extra. This is the lowest priced Kinner-powered airplane ever offered.

Introducing the new D1-W powered with the justly famous Warner "Scarab" 110 h.p. engine. Superior for business use, sport flying and training. Large gasoline capacity. Cruising speed 115 m.p.h. Priced at \$2995. D1-W DeLuxe includes Townend ring, wheel pants, Aerol shock struts, Aircraft Products wheels with semi-balloon tires, air speed, compass, front cockpit enclosure, tunnel type windshield, rear cockpit shield—for \$3295. Aircraft Products wheels with brakes and semi-balloon tires, \$175 extra. Hamilton Standard steel propeller, \$200 extra. The lowest priced Warner "Scarab"-powered airplane which parallels in performance the flexibility and maneuverability of the pursuit plane.

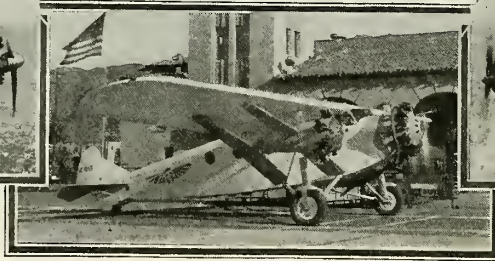
## DAVIS AIRCRAFT CORP.

RICHMOND, INDIANA

# DAVIS MONOPLANES

# Only at RYAN

can you attend a school  
with ALL these advantages!



## Lowest Rates in History

NOW IN EFFECT  
... at RYAN

- (1) TRANSPORT COURSE  
with Ground School...\$2,675
- (2) TRANSPORT COURSE  
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- (3) LIMITED COMMERCIAL  
with Ground School... \$785
- (4) LIMITED COMMERCIAL  
without Ground School... \$645
- (5) PRIVATE COURSE  
with Ground School...\$325
- (6) PRIVATE COURSE  
without Ground School...\$250
- (7) REFRESHER COURSES  
Prices on request
- (8) MASTER GROUND  
COURSE, 4 months...\$175

(9) For the sportsman pilot, or the student who wishes to insure his immediate commercial activities after graduation, the Ryan Flying School continues its deluxe combination offer of transport instruction (same as Course 1) plus new 1931 Great Lakes plane.

Combination  
Price, only .....\$3,985

EVERY PERSON with vision knows that aviation is destined to be one of the greatest of industries . . . its rapid growth will continually unfold innumerable opportunities for those who seriously prepare now.

WITH A FOUNDATION of sound Ryan training you too can take your place in this new industry of opportunity.

The T. C. Ryan Flying School—one of the oldest in the United States—is proud of its position of leadership in the quality and completeness of its courses. Under the personal direction of T. Claude Ryan, pioneer and expert airman, manufacturer and aviation training authority, the T. C. Ryan Flying School is an internationally recognized school.

Why not give yourself the best—its *wisest investment*—and it costs no more!

RYAN Graduates enjoy recognition and distinction; many of the world's foremost pilots received their start at this School.

RYAN invites inquiries about particular courses by those seriously interested.

### Outstanding Features of Ryan Transport Training

1. Tri-motor flying time.
2. Blind Flying Course in Hooded Cockpit.
3. Plenty of night flying.
4. 3500 miles of cross-country over mountains, desert, ocean shore and fertile valleys.
5. All flight instruction in most modern air-cooled equipment featuring the famous 1931 Great Lakes—holder of the world's record for outside loops.
6. Extensive five-place cabin ship training in Ryan Broughams and Fairchilds
7. Use of parachutes for all flight training.
8. A Ground School Course that is unusually thorough, exceeding minimum Government requirements by more than 200%.
9. Full Government Transport Approval.
10. Present Ryan tuition rates establish new low costs for Government Approved training.
11. Free transportation to San Diego—see special offer.
12. All training in San Diego California—recognized thruout the world for its ideal year 'round climate. . . . Remember this city has no snow, sleet or other disagreeable features of winter flying. Train under the blue skies and warm breezes of this enchanting land. Benefit by contacts at San Diego with the U. S. Government's largest aeronautical operating base.

### A Free Trip to San Diego, California

Ryan Transport students enrolling for Course 1, 2 or 9 while this offer is in effect, will be allowed free first-class railroad transportation from their home in the United States to San Diego.

Ryan Limited Commercial students enrolling for Course 3, 4 or 9, while this offer is in effect, will be allowed one-half the charge for first-class railroad transportation to San Diego.

*Fly and spend the winter in California—  
at less cost than if you stayed at home!*

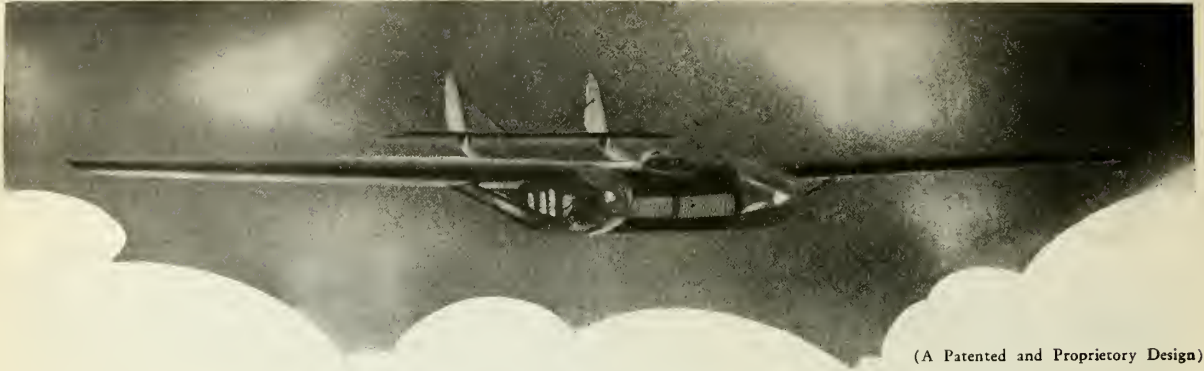
THIS OFFER SUBJECT TO CANCELLATION WITHOUT PREVIOUS NOTICE.

Name \_\_\_\_\_ Street, City and State \_\_\_\_\_ Age \_\_\_\_\_

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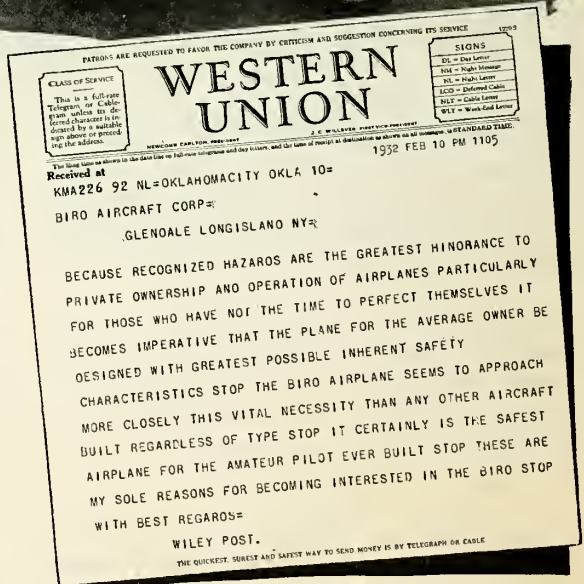
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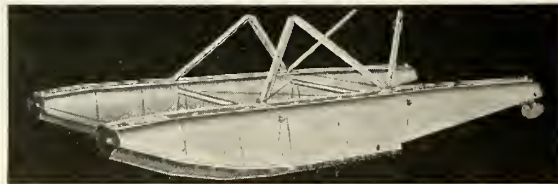
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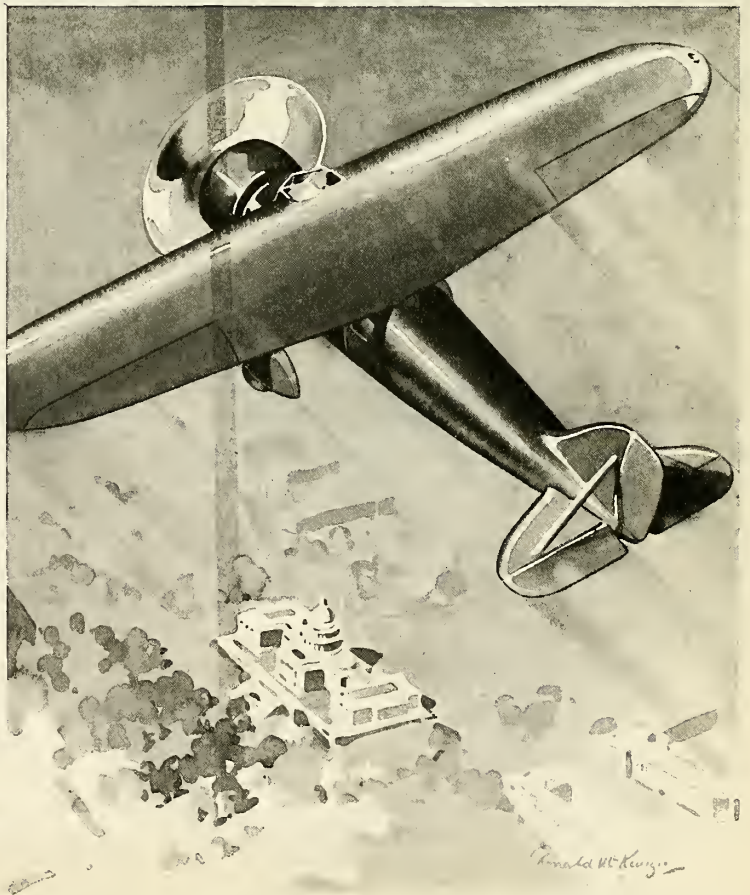
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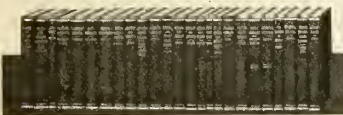
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Vol. 20 **MARCH** No. 3

*Cover Design: Martin P3M-1 Long Range Patrol Flying Boat Powered with Two 425-Horsepower Pratt & Whitney "Wasp" Engines*

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# MINIMUM REQUIREMENTS FOR U. S. AIR FORCE AND ARMY AVIATION

Major General James E. Fechet, U. S. Army (Ret.)

**A**FTER years of study, Air Force and Army aviation requirements were determined by the Lassiter Board, composed of some of the Army's most brilliant officers. The Morrow Board in 1926 recommended to the President the carrying out of the suggestions of this board but wisely proposed that the program be divided and that the first part, approximately one half, be limited to 1,800 serviceable airplanes to be raised in the succeeding five years. This would give us five years of experience and development to apply to the second half of the program, with a consequent increase in efficiency and economy. This recommendation was enacted into law by Congress.

More than the five years have elapsed, and while the entire Five-Year Program has not been completed in numbers, it has served its purpose. We know what we need, why we need it and how to get the greatest strength and efficiency for our money.

Since the original program was laid down, the rest of the world, realizing the growing importance of air power, has bent every effort towards the development of adequate air forces. We now rank fifth in air power, notwithstanding the fact that an air force adequate to meet our needs would be more valuable to us for defensive purposes than to any nation in the world.

A detailed consideration of all the elements of our defense problem is necessary in order to ascertain the minimum air strength required to insure protection of the United States and our foreign possessions. The strength and condition of readiness of the group and Naval forces must be assumed to be such as will enable them to carry out their own functions without direct support of the Air Force.

It is a popular misconception that our air strength is the total of that maintained by the Army and the Navy. Naval aviation is a part of the Fleet, which has its own function in national defense. Its duties with the Fleet are so important in a major war that the performance of Air Force and Army functions can be only incidental to Fleet operations which require or allow joint operations with either the Army alone, the Air Force alone, or, in combined operations in the same theatre, of all three. To allow such a concentration of our forces would be a strategic mistake on the part of an attacker, which is most unlikely. Our air strength is not the sum of Army and Naval aviation. Each must be considered separately.

It is the function of our mobile Ground Forces to oppose similar forces of the enemy. In order to perform this

function they must be provided with a sufficient number of observation planes which cannot be made available for any other use. In addition to its observation aviation, either the enemy or our own Ground Force can use any amount of air force in direct support of its operations. In fact, the Air Force can give such powerful support in defense against invasion from overseas that here again it would be a strategic mistake on the part of the enemy to allow combined operations, if there is any way in which to prevent it. We can expect, therefore, that landing operations of enemy Ground Forces will either be preceded by Air Force operations designed to destroy our Air Force, or that operations will be conducted to drive our Air Force to an air theatre so far away from the critical ground area that combined operations with either Fleet or Ground Forces are not possible.

Our minimum Air Force strength is that required to force an enemy to concentrate his own entire strength against it and to cause him to expend so much of it in the destruction of our Air Force that there will be little or none left to give direct support to his ground or naval forces. Otherwise, he may compensate an insufficient ground force by direct Air Force support, and at the same time protect the critical sea area in the vicinity of his bases. Our Air Force, then, must be at least equal in all the elements of air strength to that which can be brought against us.

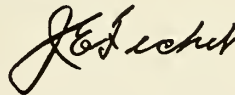
We must estimate our possible enemy strength in numbers in each type, his relative efficiency in planes and crews, his method of approach, the critical points open to his attack, and the time and rate at which he can

bring his strength to bear. In this connection, it must not be forgotten that the enemy will be able to choose the time and place of attack. The difficulties of supply and maintenance of a force not operating on its own territory is a most important element affecting relative strength. Not until all these elements of the problem have been considered and evaluated do we have a basis for our calculation.

From our own standpoint we must consider the areas we have to defend and particularly the length of our coast lines and the distance between them. We can concentrate our Air Force against the enemy only after he has disclosed his intentions by actual operations. We should be so disposed as to effect concentration at the vital point as quickly as possible, and the disposition should be such as to enable us to bring a part of our force to bear at any vulnerable point before the enemy can get established in his base and bring his whole force into concerted action.

---

**W**E have in our aviation industry and in our commercial establishment all the elements of air power which have only to be developed to make us safe from any aggressor. The inter-relation between military and commercial aviation is so close that the moneys spent on our defense will be returned to us in a more economical and efficient commercial service which benefits every business and industry in the country.



Major Gen., U. S. Army (Ret.)

---

Until our fleet has been concentrated in the proper ocean, the Panama Canal must be maintained intact. Its defense from air attack is vital to our whole defense plan. For a war in the Pacific, the Hawaiian Islands are of great strategical importance. We also have the Philippine Islands which should be defended, if we hope to maintain our influence in the East. All these are out of supporting distance from the continental United States. Each of our foreign possessions must have their own Air Force ready at all times, and the size of each must be determined after the same fashion as the Air Force on the continental United States.

There is, however, an element of support to our defense problem on the continent afforded by the Air Forces located

#### MINIMUM AIR FORCE REQUIREMENTS

	Class	Wings	Groups	Squadrons	Planes
Continental U. S.	Pursuit	1	3	12	317
	Bombardment	1	2	8	108
	Attack	1	3	12	317
	Observation		1	4	56
	Transport		1	4	56
	Transport for units				36
	<b>TOTAL</b>	<b>3</b>	<b>10</b>	<b>40</b>	<b>890</b>
Panama	Pursuit		1	4	104
	Bombardment			2	26
	Attack			2	48
	Observation			2	26
	Transport				4
	Overhead	1	1		9
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>10</b>	<b>217</b>	
Hawaiian Isl.	Pursuit		1	4	104
	Bombardment			2	26
	Attack			2	48
	Observation			2	26
	Transport			1	13
	Overhead	1	2		14
<b>TOTAL</b>	<b>1</b>	<b>3</b>	<b>11</b>	<b>231</b>	
Philippines	Pursuit		1	4	104
	Bombardment			2	26
	Attack			2	26
	Observation			1	13
	Transport				13
	Overhead	1	1		9
<b>TOTAL</b>	<b>1</b>	<b>2</b>	<b>9</b>	<b>191</b>	
<b>TOTAL IN SERVICE</b>		<b>6</b>	<b>17</b>	<b>70</b>	<b>1,529</b>

in the foreign possessions. It is a strategical principle that forces be concentrated against the most important objective, which in a war, where we are seriously in danger, is, of course, our industrial area on the continent. No enemy can afford to expend so much of his air force in the early stage of a war on the capture or destruction of vital areas in the foreign possessions that he will not have left a sufficient force for his operations on the continent. This fact allows us to locate in Panama, Oahu, and the Philippines a force smaller than that which the enemy could bring against us. Otherwise, we should have to prepare equally at all points. The strength in our foreign possessions need be only such as to make operations against them too costly to the enemy.

#### MINIMUM REGULAR ARMY OBSERVATION

	Wings	Groups	Squadrons	Planes
Corps Observation	3		9	129
Coast Defense	2		6	82
Army Observation	1		2	32
National Guard			19	247
<b>TOTAL</b>	<b>6</b>		<b>36</b>	<b>490</b>

The Air Forces maintained by all nations in time of peace must of necessity be relatively small. Once Air Forces lock horns in combat for air supremacy, one or the other will be destroyed in a very short time. In the process, the victor will probably lose an amount almost equal to the vanquished. After this phase, which will be forced as early in the war as possible, there will ensue a race for production of a new Air Force. The nation which has the most efficient industry and commercial establishment, coupled with plans and facilities for their early employment, will have the best chance of regaining air supremacy once lost, or of maintaining it, if initially successful. Our air requirements in the peace-time establishment must include, therefore, not only detailed plans for the quickest possible development of our aviation resources, but planes, personnel and facilities required to carry out our plans in such a way as to take advantage of every opportunity presented by the commercial and industrial establishment. While civil and commercial aviation can be of little use in the first phase of a war, they are invaluable in the race for superiority in the second phase. The training and production establishment must be prepared to operate at full blast on the declaration of war.

Our Air Force requirements are built up, therefore, by determining the needs of: (a) the continental United States; (b) the foreign possessions; (c) observation aviation for the Ground Forces, and (d) the establishment for war expansion.

Many of the elements upon which our requirements are based are secret and confidential, and no public discussion of them can be considered. The results of our analysis of our problems are, however, of vital public concern and not only should but must be brought to public as well as official attention, if our defenses are to be brought up to minimum requirements and maintained in a proper state of efficiency.

Based on actual 1932 Air Corps procurement, there will be on hand, on July 1, 1932, the following: Tactical planes in readiness for action, 753; auxiliary planes, 838; total planes of all types for all purposes, 1,591.

It will be noted that nowhere in the accompanying tables of requirements is a reserve for war expansion mentioned. The Air Force must be ready for instant action on the outbreak of war, and there is no time at which our whole strength is required more than in the opening phases of war.

Tactical units must be equipped with the most up-to-date

#### TACTICAL UNITS AND PLANES READY FOR ACTION

	Wings	Groups	Squadrons	Planes
Active Air Force Units	6	17	70	1,529
Active Regular Army Units		6	36	490
Depot Repair (On overhaul)				253
<b>TOTAL</b>	<b>6</b>	<b>23</b>	<b>106</b>	<b>2,272</b>

airplanes in order to perform their functions. With the present rate of development in aviation, the efficient life of an airplane in the tactical units is about three years. At the end of this time planes which are no longer capable of meeting tactical requirements are shifted to the training establishment, where they remain in service until they are no longer safe to fly. The requirements for tactical planes of the training and auxiliary establishments are filled largely as salvage from tactical units. The yearly replacement rate for tactical equipment should, therefore, be approximately 760, and for training planes, approximately 160—a total of 920, or some seventy-six per month. Even though all this number were not required for active service, it is barely sufficient, when Navy needs are added, to maintain the industry in that state of efficiency required for it to perform its own war functions which are vital to the prosecution of any war.

*This is the third of a series of articles on National Defense by Major General James E. Fechet, U. S. Army (Ret.) These articles will continue to appear exclusively in AERO DIGEST each month.*

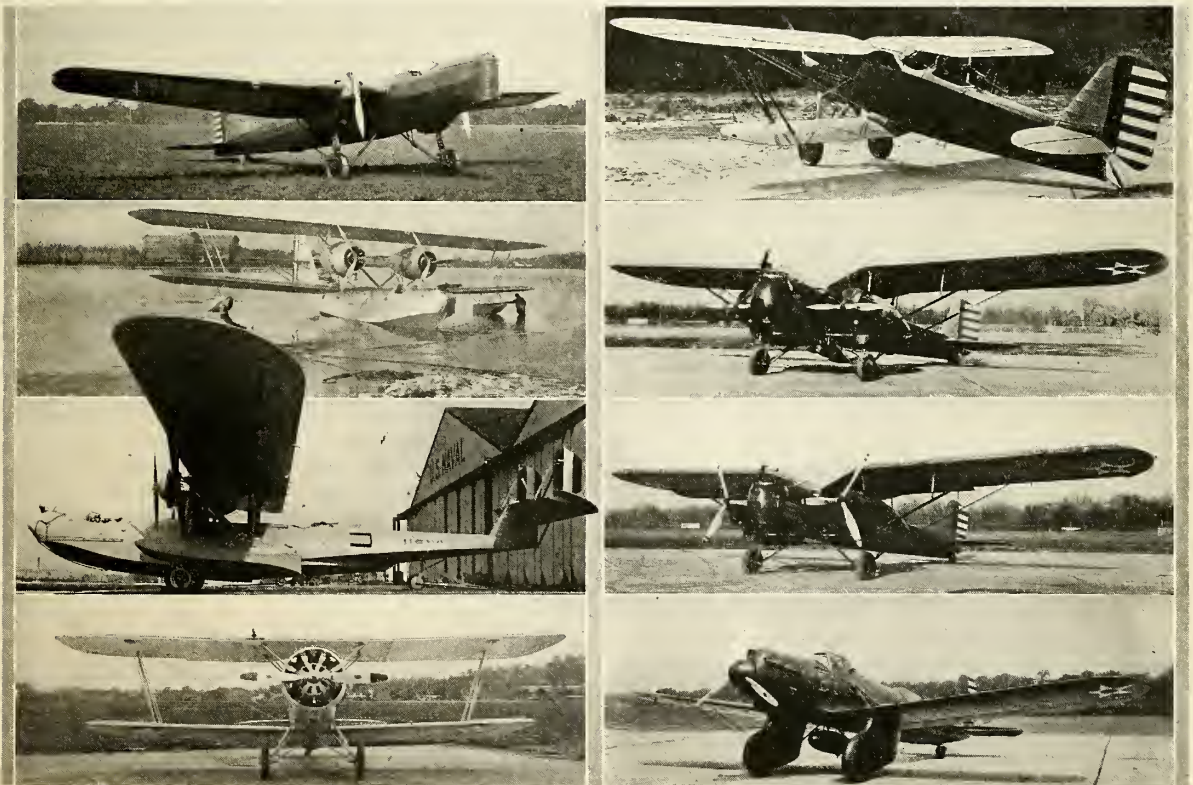
**AUXILIARY AIRPLANES REQUIRED TO MAINTAIN AIR CORPS**

Schools (640 training, 320 tactical)...	960
Depots; Materiel Div.; Engineering...	50
Organized Reserves .....	200
Miscellaneous Activities .....	132
<b>Total in active service.....</b>	<b>1,342</b>
<b>Out of service (On overhaul)...</b>	<b>168</b>
<b>TOTAL .....</b>	<b>1,510</b>

**TOTAL TACTICAL AND AUXILIARY AIRPLANE REQUIREMENTS**

Tactical Units .....	2,272
Auxiliary Activities .....	1,510
<b>TOTAL .....</b>	<b>3,782</b>

IN the group of military airplanes below are several of the more recent types now being experimented with or in production for the Army and Navy. The Fokker cantilever monoplane is a twin-engined type for observation. The Hall twin-engined flying boat is intended for patrol work. The Martin, with two Pratt & Whitney "Wasp" engines, is one of the largest military flying boats. One of the fastest light two-seater observation types is the X-OJ, produced by the B/J Aircraft Corporation. Twenty-five of the X-P-16 two-seater fighters are being constructed by the B/J Aircraft Corporation. These are powered with 625-horsepower liquid-cooled twelve-cylinder Curtiss Conqueror engines. The Douglas bomber carries a crew of three in tandem; this is an externally braced gull wing monoplane with metal monocoque fuselage. The B-7 has a direct-drive Curtiss engine, and the O-35 has a geared engine of 600 horsepower. Thirteen Curtiss A-8 ground attack planes were ordered for the Army Air Corps; this type is a low-wing monoplane with an enclosed cockpit. It carries six machine guns and a single 500-pound bomb slung below the fuselage.



Some recent American Military Airplanes: (left column, top to bottom) Fokker O-27, Hall Navy X-P-H-1, Martin Navy P-3-M-1, B/J Navy X-O-J; (right column, top to bottom) B/J, X-P-16, Douglas B-7, Douglas O-35, Curtiss A-8

# AIR—HOT AND OTHERWISE

## TAKE POLITICS OUT OF RESEARCH

●

Frank A. Tichenor

**L**AST month on our editorial page we had something to say regarding the National Advisory Committee for Aeronautics. Few articles in *AERO DIGEST* have met with such an immediate and approving response. Opinion is unanimous that something should be done toward seeing to it that money appropriated for this bureau should be utilized in such a manner that the industry will receive as its product that for which it has been avowedly spent. The industry realizes that this body could be of the utmost help in solving vital problems much more quickly and efficiently than the various manufacturing organizations are likely to be able to work them out in their own laboratories. But it also realizes that this help is not forthcoming.

The chief duty for which the N. A. C. A. was created by law was to supervise and direct scientific study of the problems of flight and determine those matters which should be experimentally attacked. As the various annual reports of the N. A. C. A. are looked through, complete failure seems to be indicated of those supposed to be actively engaged in its direction to fully understand the purposes of the Committee.

The law requires the N. A. C. A. to give an accounting of how its large appropriations have been spent, what results have been achieved, and to what policies the Committee stands committed.

During 1930 the N. A. C. A. spent close to a million and a half dollars, a sum important even in this rich and spendthrift nation, and very noteworthy indeed in connection with our new and struggling (though ambitious) industry. The N. A. C. A. now has more than two hundred employees, which is more than most airplane factories at present have. With that much money and that many earnest and able workers one would imagine that results could be achieved worthy to thrill the whole industry. It is natural that we should wish to know exactly what the results are.

At first glance, the report seems to be voluminous, for the volume comprises 787 pages, but on examination we find that only sixty-six of these pages constitute the report itself. The balance of the white paper so generously consumed is devoted to reprints of various technical papers, many of which originated outside of the N. A. C. A.

We search in vain for evidence that the N. A. C. A. has performed the chief duty for which it was created and in connection with which it has been entrusted to expend its appropriation, that is, for the supervision and direction of a scientific study of the problems of flight. What little is said upon this subject is too disconnected and unsystematic to have actual value, and of the history of current endeavor along that line in which it is especially interested the report contains less than is likely to be found in the aviation sections of any enterprising Sunday newspaper.

On page 66 it is declared: "The research programs of the Committee are carefully prepared, in the light of the

facilities and funds available and with information and advice . . . from the War, Navy and Commerce Departments. These programs cover broadly the whole field of aeronautics."

Brave words! They arouse the avid curiosity of men who are spending their money and their lives in aviation. Such men (among them ourselves) naturally yearn to know the details of those wonderful programs which have been worked out by the master minds selected as the result of the Government's generosity. Research programs of such immense scope that they "cover broadly the whole field of aeronautics" would, of themselves, be fascinating things to study. They would be certain to stimulate to useful activity many minds not directly connected with them. Their mere creation, along worthwhile lines, would be an achievement. But although the N. A. C. A. assures us that it is following such programs it does not tell us what they are. Those hidden programs! How we would love to ponder them!

We find ourselves bewilderingly disappointed when we think about the glorious original plan, the generous supply of money, and the result which consists merely of the statement that things are being done—mysterious things, with which we are not made acquainted. All we can know about them is their annual cost; all we can do about them is to pay the bills. Congress now is notoriously inquisitive about expenditures of public money. It made a splendid gesture when it gave to the N. A. C. A. so willingly. Is it not reasonable to suppose that soon it will begin to ask what is actually being done with all that cash?

The magnificent reference to "programs" in the plural—wide, generous, sweeping, all embracing—is not, moreover, consistently adhered to. On page 13 we are informed that three suggestions have been "added to the program"—as if there were only one. Such sudden shrinkage from the magnificent plural to the paltry singular must be a shock. And which term are we to take seriously—if any?

If research is prospering, we are kept in the dark about it. For the first time in years no mention is made of the importance and need for "fundamental research." The problems mentioned on page 65 are not, in fact, problems of research, apparently, but questions to be answered by the industry, not by the N. A. C. A.

In this connection it is noteworthy that for the first time in years the report fails to conclude by stressing the importance of "fundamental" research. It only begs financial support for "well organized scientific research." Does this mean that the great problems are to be abandoned and time entirely devoted to such routine matters as measurements and so on, which do not require deep and profound thought? Here, perhaps, is the door through which high experts, capable of deep thinking, vanish. Perhaps what the N. A. C. A. prefers to give its time to is something at which ordinary political appointees may have

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# THE FLIGHT SURGEON

Lieut. Colonel Glenn I. Jones, M. D.

Chief Flight Surgeon, U. S. Army Air Corps

AT the present time from sixty to eighty per cent of aircraft accidents are chargeable to pilot error—faulty judgment, disobedience of orders, negligence, poor technique or miscellaneous fault. This constitutes a severe indictment of personnel on whose training and maintenance large sums are expended and who are expected to operate valuable aircraft safely.

Increased engine efficiency and reliability, improved airplane design, construction and maintenance, better handling qualities and more precise knowledge of the capabilities of different types of planes have reduced the hazard of flying. Despite these contributions to safety, the pilot, year after year, continues to be responsible for a high percentage of accidents.

The following considerations have acted as restraints on the progress of aviation and should be emphasized:

(1) Failure to recognize and appreciate the urgent and continuous necessity for an exceptionally high standard of physical fitness.

(2) Tardiness in providing an adequate, well-trained corps of flight surgeons with opportunity and authority to perform those duties in relation to flying personnel which assure physical fitness.

(3) Reluctance to deal radically and constructively with those pilots who lag behind the procession and whose deficiencies undoubtedly swell the error totals, an indulgence in the interest of individuals which adversely affects an entire group.

(4) Too much willingness to accept the prevailing high percentage of personnel error as an irremediable evil, thus stifling constructive recommendation and effort.

Flying subjects man to unfamiliar environmental factors, and places under his control a new and powerful mechanical instrument of speed which greatly taxes his resources. It creates, thereby, a new experience which is capable of providing an extraordinary test of his stamina and adaptability. The estimate of aptitude for new and specific tasks relies on an evaluation of the individual's entire equipment. It seeks to weigh the potentialities of body and mind and to apply them to the demands of the special situation. It considers native and acquired resources and computes their utilization.

The variability of the physical and nervous resources of the individual flier and the variability of his flying tasks multiply, in almost direct proportion, the reaction to physical and nervous stress and strain with reactions which determine his daily capacity to make flights. The military aviator is subjected to the greatest variety and intensity of strain and stress. To fulfill the requirements of successful



flying in the military service individuals intended for such duty must be especially selected because of the necessity for a high order of physical endowment and a peculiar and exceptional neuro-psychic or temperamental make-up. The latter is difficult to analyze, but experience has shown that a majority of selected candidates for flying training, otherwise physically acceptable, lack that combination of qualities, essentially mental and nervous, required for successful issue of flying training.

Briefly stated, the physical requirements for good flying are:

Perfect unocular and binocular vision; unimpaired ocular muscle balance; an optical organism unimpaired anatomically and mechanically; good respiratory ventilation and vital capacity; good hearing; a stable and balanced equilibrium; a stalwart cardio-vascular system (nervous and organic); a robust, supple, well-formed, well-adjusted and coordinated physique; an integrated and stable nervous system in combination with that temperamental constitution which makes for aptitude for flying.

No attempt will be made to describe the neuro-psychic combination most desirable for successful flying, but the majority of candidates especially selected for flying training in the Army fail to succeed for reasons not physical but neuro-psychic, expressed in reactions indicating inaptitude for the special task. It can generally be stated as uniformly manifesting itself in tenseness based on apprehension.

More than fifty per cent of the eliminations of cadets are the result of unfavorable neuro-psychic reactions to air performance tests and which preclude successful issue of flying training.

The flight surgeon should be particularly well equipped professionally and thoroughly trained and experienced in making the special tests included as a part of the examination of flying personnel. He should be tactful, approachable, sympathetic, resourceful, forceful, tolerant, broad-minded, optimistic, fearless and energetic, and should have that interest in people and experience in life which make for "understanding human nature." When the flight surgeon does his part and meets his responsibility, his accomplishment will be reflected very positively in the flying efficiency of personnel and the reduction of aircraft accidents. Upon him rests the serious responsibility of selecting from those applying for flying training the ones most physically and temperamentally fit. An equal, perhaps greater, responsibility, however, is the continuous care of the flyer; namely, maintaining that high level of efficiency capable of expressing itself

(Continued on page 94)

# GUYED TO STOCK PROMOTIONS

*by Caldwell*

**P**ROSPERITY, so we've been informed for the past two years, is just around the corner. Therefore it is well to look ahead to that time when they stop hauling the corner away just as we are about to turn it. It is advisable to have some plan—a five-year or even a five-cent plan—all ready to put into operation the moment Prosperity responds to the advertisement, "Come home—all is forgiven."

Now, as a reward for you six readers who have stuck to me through this period of adversity, I am going to let you in on my plan for achieving wealth the moment the depression, which is no longer referred to as the so-called depression, fades into the background. I intend to become a company promoter, and I'm going to be big-hearted enough to tell you just how the trick is done.

First of all, get yourself a broker who still has some customers. I know this is hard to do, for half the brokers and nearly all of the customers fell into the Hudson, or got in on the ground floor and dropped into the sub-basement. But dig up an unbroken broker who knows a banker who hasn't loaned all of his bank's money to his directors, and who isn't in jail. With this combination you are off on a hunt for stockholders.

Right here is the spot to revise your idea of what constitutes a stockholder. Three years ago it was a man with money; today it is the same man with enough stock certificates to paper his house with, only he hasn't enough money to buy the paste. I know a stockholder who also owned a cow. And he went to a farmer to get a bale of hay for his cow. "I'll trade even," he said, "a bale of stock certificates for a bale of hay."

This gives you a hint of what you may expect from your stockholders, either a nickel or a dime. Mind you, if they still have either one, you and your broker will get it, because the rule is, "Once a sucker, always." So the post-depression par value of your stock issue should be a dime, which by that time will be the largest piece of money in circulation. For the nickel you issue a half share or a pass over the airline, when, as, and if started.

Now that you have your banker and broker lined up and ready to commit assault and battery on your prospective stockholders, it is well to have something definite to sell them. This didn't used to be necessary—in 1929. I've known stock to be sold on the mere statement, "Gimme your money and I'll do something with it." All of the investment trusts were started on this one remark. However, the ten-cent stockholder of the future will demand more than this. Hence you must have a company planned to do something. Oh, I know it's a bore, but you must.

Now, on this matter you may suit yourself. Perhaps you fancy the light plane on which the masses of the future are going to clutter up the sky. Very well then, a light plane company is the thing for you. In your prospectus

don't fail to mention that a man who had invested even a dime in the first Ford would now be too rich to ride in one. It is an old sales argument that was used by all the company promoters of the pre-panic period, but it's still good. Stockholders have absolutely no memories.

Or perhaps you are the greasy sort of chappie who likes engines. Very well. Start an engine company, preferably to market an engine that works, or doesn't, on an entirely new principle. You don't even have to invent one; there are several, with various degrees of vibration and leakage, left over from the boom, that you may secure for a song. It doesn't even have to be a good song; one of these things the little radio fairies croon will serve.

For myself, I intend to promote an airplane and motor company, attached to an airline, a flying school, and an airport. In this manner I cover the entire field and have a market for my aircraft and engines right in my own midst, as it were. In this neat way I solve the problem of what to do with the airplanes and engines after I manufacture them—I sell them to myself. Of course, after I've sold myself all the airplanes my school can use or knock apart, then I proceed to incorporate other companies—further sections of myself, as you might say—to do aerial surveys or crop dusting or whatnot. Mostly whatnot. About half of the pre-panic companies were incorporated for whatnot or whynot or as it turned out, mostly ifnot and cannot.

Possibly you six readers have not previously delved into finance except from the stockholder, or sucker, angle. If you haven't, of course you need some hints as to the proper method of organization. Therefore what follows may be used as a guyed. We'll take, as a simple example, the organization necessary for an airplane company. And you'd cry yourself to sleep if you knew how simple some of those companies were.

First off we have the dime stockholders, bound, gagged, and pried loose from their dimes. This is the foundation of your company, a foundation being something that something else rests on and pushes down into the ground. Which is precisely what you do with a stockholder.

The stockholder now disappears and is never heard of again. Representing him, however, we have what is called a director, because usually he doesn't. His function is to meet others like himself once a month and receive a twenty-dollar gold piece. That's all he does, but he does that very well and adds an air of intense dignity to your company. Some companies maintain sleeping accommodations for directors during board meetings—sometimes spelled bored meetings—but this is really superfluous. An ordinary leather upholstered chair is considered quite good enough for directors to sleep in until the chairman, sometimes

*(Continued on page 92)*



# GRAPHICAL SOLUTION OF A BEAM UNDER COMBINED COMPRESSION AND TRANSVERSE LOAD

By

Dr. Michael Watter

**I**N routine practice it is useful and often necessary to have available the complete bending moment, shear and deflection diagrams for a beam. This information is particularly valuable for a thorough detail design and to arrive at a sound proportioning of the structure. In case of an error in the shop, such data enables a ready determination of the degree of magnitude of the mistake and makes it possible to calculate, verify and justify the necessary repairs. Since analytical determination of a complete bending moment diagram (not considering shears and deflections) requires a set of laborious calculations, it was deemed desirable to evolve a new procedure sufficiently simple and accurate to be practical. In 1926 the author published an article on a method of graphical determination of the bending moment diagram for a beam under combined compression and transverse loads. At that time the solution was given treating Arthur Berry's method described in "Airplane Structures" by Pippard and Pritchard. Since then the method was extended to include graphical determination of the shears and deflections. In view of the wide use of the Army Air Corps "precise" method given in "Airplane Structures" by Niles and Newell, the former solution was revised in order to make it also directly applicable with the precise method. For the general derivation of the formulas and the nomenclature, the reader is referred to Chapter XI page 185 of "Airplane Structures" by A. S. Niles and J. S. Newell.

Particular attention is invited to the mathematical significance of the trigonometric functions appearing in the solution of differential equations involved in the problem of combined compression and bending. As pointed out by Niles and Newell, these trigonometric functions must be thought of actually as representing the infinite series whose limiting magnitude can be considered as the sides of a right triangle usually employed to define the Sine  $x$  and Cosine  $x$ , when one angle of a right triangle is  $x$  radians in magnitude. This property makes possible the graphical construction described in this article, but the reader should not lose sight of the true significance of the functions.

**Precise Bending Moment**

The general expression of the bending moment can be written as follows:

$$M = C_1 \sin(x/j) + C_2 \cos(x/j) + wj^2 \dots \dots 1$$

**T**HERE is little necessity to advocate or defend the use of graphical methods whenever an engineering problem may be solved conveniently in this way. Among the advantages of graphical methods are: clarity of solution, means of easily checking the diagrams, detection of any major mistakes, compactness of record and, in some cases, means of readily solving problems which are difficult of analytical solution. Although in the beginning some engineers are reluctant to use any graphical method, once they acquire the facility of its application they seldom resort to solutions by the analytical methods.

where  $x$  is the distance from the left support and  $w$  is the uniformly distributed transverse load. In the expression of  $j = \sqrt{\frac{EI}{P}}$ ,

$E$  is the modulus of elasticity,  $I$  the effective moment of inertia and  $P$  the axial compression.  $C_1$  and  $C_2$  are the constants of integration which can be determined from the conditions at the two supports;  $C_1 = [D_2 - D_1 \cos(L/j)]/\sin(L/j)$ ;  $C_2 = D_1$ ;  $D_1$  and  $D_2$  are introduced for brevity and designate as follows:  $D_1 = M_1 - wj^2$ ;  $D_2 = M_2 - wj^2$ .  $L$  is the length of the bay,  $M_1$  the bending moment at the left support,  $M_2$  is the moment at the right support.

While the present solution can be extended to include the case of transverse loading other than uni-

form (see 11:5 Niles and Newell) the present article deals with a uniformly distributed transverse loading only (11:2). By observing the equation 1 we notice that by drawing two circles with radii equal respectively to  $C_1$  and  $C_2$  and distant  $wj^2$  and by considering the signs of the products  $C_1 \sin(x/j)$  and  $C_2 \cos(x/j)$ , it is possible easily to obtain their magnitude for any value of  $x$  from zero to  $L$ . It will be found in most practical cases that  $C_1$  and  $C_2$  will have a sign opposite to that of  $wj^2$  and we will assume that they are negative. The construction, however, is simple and once it is understood it can be easily changed to take care of the actual signs of  $C_1$  and  $C_2$ .

Noticing that  $\sin(x/j)$  changes from zero to  $\sin(L/j)$  while  $\cos(x/j)$  from 1 to  $\cos(L/j)$  it is obvious that the angle  $57.3^\circ (L/j)$  must be drawn in such a way (if we want to measure the bending moment, along  $y$  axis) that for the value of  $x=0$  the products  $C_1 \sin(x/j)$  and  $C_2 \cos(x/j)$  become zero and  $C_2$  respectively. This can be obtained by measuring the angle

$57.3^\circ (L/j)$  on the circle  $C_1$  from the horizontal, while on the circle  $C_2$  it must be measured from a vertical diameter.

After this brief consideration, the reader will have no difficulty in following the procedure involved in obtaining graphically the precise bending moment diagram. In practice, the actual work must be done with due consideration of the accuracy desired and the means available for drawing, which will influence the choice of scales.

Draw the beam 1-2 and on the continuation of the line choose a center from which the circle  $C_1$  must be described. Measure downward along the continuation of the vertical

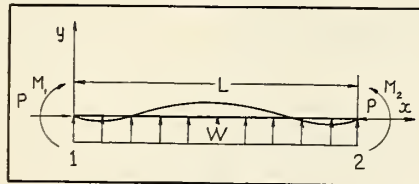


Figure 1

diameter the distance  $wj^2$  and from that point as a center describe the circle  $C_2$ . Lay out the angle equal to  $57.3^\circ (L/j)$  from a horizontal diameter and construct this angle also on the circle  $C_2$ , in which case it must be started from the vertical diameter. (The construction is illustrated in figure 2 and made clockwise). Dividing the length of the bay and the arcs 1-2 of the circles  $C_1$  and  $C_2$  into any number of equal parts, we construct the bending moment diagram by simply projecting the points horizontally from the circles on the vertical lines passing through the corresponding points on the beam. In figure 2 the construction is illustrated for the point b. It can be easily proved that the ordinates enclosed the lines  $1b_1 2_1$  and  $1_2 b_2 2_2$  represent the bending moments at the corresponding points of the beam in the scale in which were drawn the circles  $C_1$  and  $C_2$ . In fact  $b_1 b_2 = Ob_1 + Ob_2 = C_1 \sin(x/j) - wj^2 + C_2 \cos(x/j)$ .

In order to obtain the circles  $C_1$  and  $C_2$  it is, however, not necessary to calculate the magnitude of  $C_1$  and  $C_2$ , since we can make the following observations: From figure 3, we see that since the distance  $O_1 O_2$  is equal to  $wj^2$ , if we lay out downward from  $O_1$  the segment  $O1_2$  such that it is equal to  $M_1$  we obtain immediately  $C_2$ .  $C_2 = D_1 = M_1 - wj^2 = -(wj^2 - M_1)$ .

To obtain the  $D_2 = M_2 - wj^2$  lay out upward  $O_2 O1_1$  equal to  $M_2$ , obtaining  $O_1 O1_1$  which is equal to  $-D_2$ . To obtain  $C_1$ , after having constructed the angles  $57.3^\circ (L/j)$  we observe from figure 3 that taking  $O_2 2_v$  and adding it downward to  $D_2$  along vertical diameter we obtain point  $21_v$  such that the intersection of a horizontal through that point with radius  $O_1 2_1$  gives us  $C_1$ .  
 $O_2 2_v = D_1 \cos(L/j)$   
 $O_1 21_v = D_2 + D_1 \cos(L/j)$   
 $O1_2 = O1 21_v / \sin(L/j) = [D_2 - D_1 \cos(L/j)] / \sin(L/j)$ .

Attention is invited to the fact that angle  $57.3^\circ (L/j)$  must be drawn accurately since otherwise it may result in a large error in  $C_1$ . As a check, the distance  $21_v 2_v$ , equal to  $M_2$ , may be used before proceeding with further construction of diagrams.

**Precise Shear**

By differentiating the expression of the bending moments (equation 1) we obtain the expression for shear as follows:

$$\frac{dM}{dx} = S = \frac{1}{j} \left( C_1 \cos \frac{x}{j} - C_2 \sin \frac{x}{j} \right)$$

It can be readily seen that if we draw the beam, divided into the same

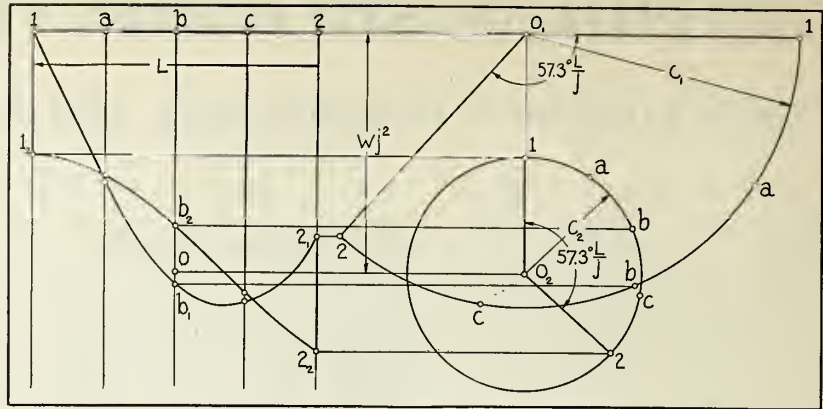


Figure 2. Construction of precise bending moment diagram

number of parts as before, along the continuation of the vertical diameter and project from the circles  $C_1$  and  $C_2$  the points 1 ..... b ..... 2 on the horizontal lines drawn through the corresponding points on the beam, the horizontal distances between the two curves thus obtained will give us the magnitude of shear in the scale of  $M/j$  where  $M$  is the scale of moments (see figure 4).

**Maximum Bending Moment**

The location of the maximum bending moment is determined from the shear diagram at the point of zero shear.

**Deflections**

In order to obtain the deflection, we observe the fact that the expression for precise bending moment can be written

$$M = M_0 - Py \dots\dots\dots 2$$

Figure 3, (below) Circles  $C_1$  and  $C_2$

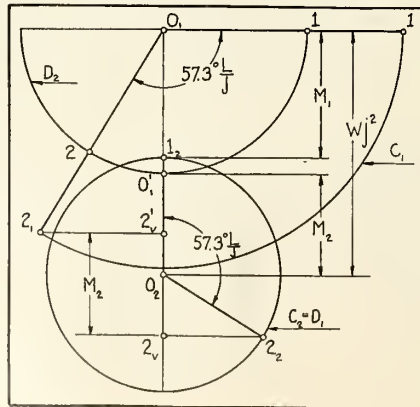
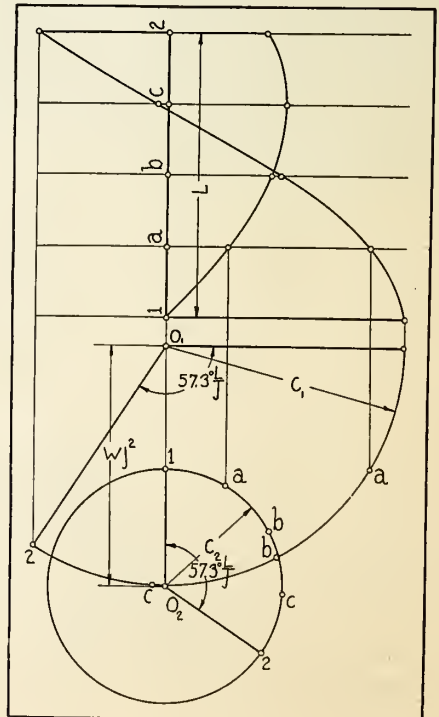


Figure 4, (right) Construction of precise shear diagram



Where  $M_0$  is the primary bending moment due to the transverse load alone.

From equation 2 we can express:  $y = (M_0 - M) / P$   
 It is evident, therefore, that in order to obtain the deflection, we can simply superimpose the diagram of precise and primary moments and by dividing the difference between the two moments by axial load  $P$  to determine the magnitude of the deflection at any point. If however, we should replot the precise bending moment diagram on a horizontal base by using a new scale of moments  $M = P$  (where  $M$  is the new scale of moments and  $P$  is the compression load) and construct the primary moment to the same scale, we will obtain directly the deflections to their actual magnitude. The replotting of the precise bending moment can be easily accomplished by using a proportional divider or by a method of similar triangles. The primary bending moment for a uniformly distributed load is simply

constructed as a parabola and the example (figure 5) gives the constructional lines involved.

**Example Showing Application of the Method**

To illustrate the practical application of the method described in this article, a complete determination of precise bending moment, shear and deflection diagrams is given here for the metal truss beam whose properties and effective moment of inertia were determined by Andrew F. Swichard in NACA T.N. 383 (pages 24 to 31 inclusive).  
 Data:

$L = 180$  inches;  $P = -6000$  pounds;  $I_{eff} = 5.76$  inches<sup>4</sup>;  
 $E = 10000000$  pounds/square inch;  $M = -40000$  inch pounds;  $M_0 = 0$ ;  $w = -12$  pounds/inches;  $j = 97.98$ ;  
 $j^2 = 9600$ ;  $wj^2 = -115200$ ;  $L/j = 1.838 = 105^\circ 19'$ ;  
 $wL^2/8 = 48600$  inch pounds

In constructing the deflections, the scale used was  $M = 2P$ .

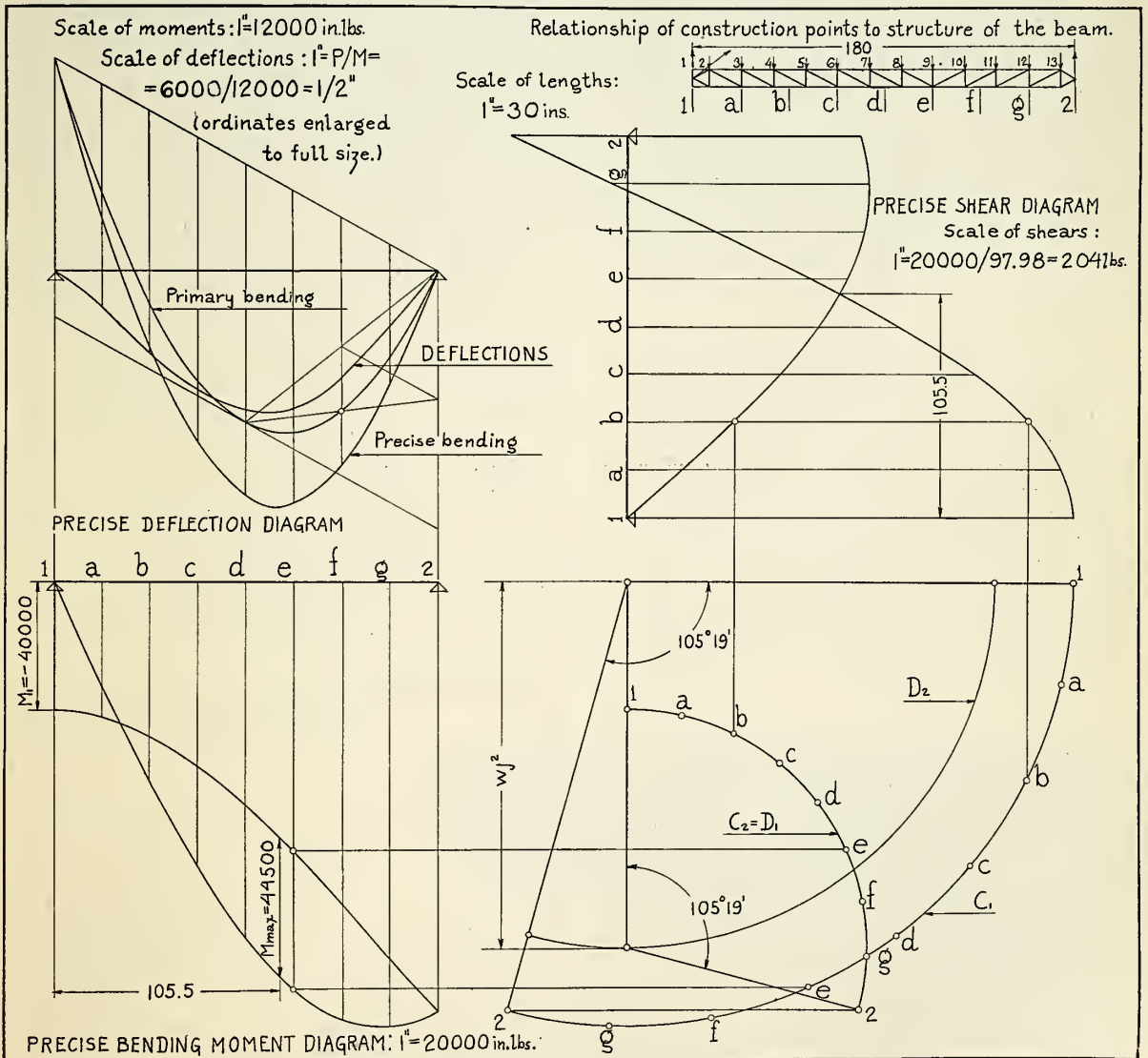


Figure 5. Graphical solution of the beam analyzed by Andrew E. Swichard

# HIGH TEMPERATURE LIQUID-COOLED AIRCRAFT ENGINES

WITH the constant improvement in the power output of air-cooled engines, the need for development of the liquid-cooled engine to keep up with this competition is evident. Why should there be so much interest in this country and abroad in developing the liquid-cooled engine, which has the additional handicap of the radiator, piping, and the additional weight of these parts, plus the accepted increase in maintenance cost? The answer is that the liquid-cooled engine can operate at much lower specific fuel consumption and has a smaller frontal area with consequent less resistance and much better visibility from the pilot's cockpit. These features appear to carry sufficient weight to affect the design of engines, both military and commercial, all over the world.

The most outstanding recent example of engine performance is the British Rolls-Royce water-cooled engine which holds the world's speed record. More power per cubic inch was obtained from this engine than has ever been obtained from any aircraft engine. In France and Italy the preponderance of liquid-cooled engines shows that the old question of air- versus liquid-cooled engines is just as controversial as ever.

The purpose in going to higher temperatures with the coolant liquid, as has been done in the last two or three years, is to reduce the use and weight of the cooling radiator. A saving in weight of about .2 pound per horsepower can be obtained, and the area of the high temperature liquid-cooled radiator is about thirty-five per cent of the water radiator for the same engine condition. The saving in radiator use is measured by more than the difference in the two temperatures of 250 degrees F. and 180 degrees F. would indicate, owing to the lower specific heat of the ethylene glycol or Prestone, which results in higher cylinder wall temperatures than one would expect from the above temperature difference. This fact puts a definite limitation on

By

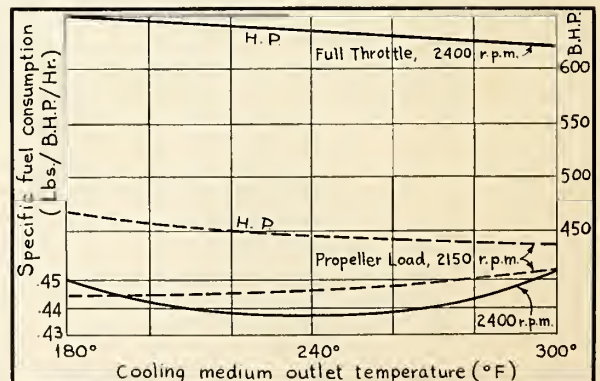
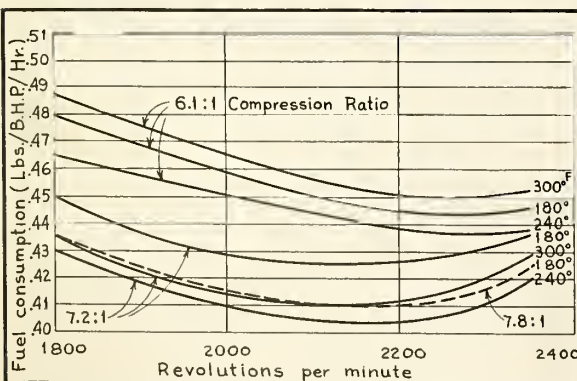
Arthur Nutt

the power obtainable with high coolant temperatures, a phenomena which will be discussed further.

Considerable development and test work on the Curtiss Conqueror, produced by the Wright Aeronautical Corporation, has brought to light many interesting facts. This engine has what is known as a dry combustion chamber, obtained by inserting a closed end steel cylinder barrel in an aluminum alloy head casting, and has a wet sleeve surrounded by a coolant jacket. This construction was found necessary to enable large intake and exhaust valves to be used, the steel-headed sleeve providing sufficient strength between valve seats to prevent failures, which would have persisted if an attempt had been made to retain the aluminum combustion chamber with inserted aluminum bronze valve seats. The opinions given in this article in general apply to an engine with this construction, since all test work was done on the Curtiss Conqueror, and the conclusions might be altered with a different construction.

The results of many tests have shown that with this type of cylinder construction nothing is gained by exceeding an outlet coolant temperature of 250 degrees F. A series of tests varying this temperature from 180 degrees F. to 300 degrees F. indicate that the best fuel economy is obtained at about 250 degrees F. There is a gradual decrease in maximum horsepower as the temperature is increased. As the outlet liquid temperature is increased, the amount of power increase resulting from the use of higher compression ratios is decreased.

The fact is no doubt brought about by the necessity for much better anti-detonating fuels at the higher outlet liquid temperatures. It is an open question as to how far the use of higher outlet temperatures should go, as the loss of power from not being able to ground boost an engine with the best fuel available may overbalance the other advantages gained by the use of the smaller and lighter radiator.



Power curves showing the effect of cooling medium temperature on Curtiss Conqueror engines. (Left)—effect on propeller specific fuel consumption; (right)—effect on power and best economy fuel consumption, engine with 6.1:1 compression ratio

It is possible that a wet combustion chamber cylinder will permit the use of more intake manifold pressure than the dry sleeve type, but it is probable that the loss of power as the temperature of the outlet liquid coolant rises will still be present to some degree, being more noticeable at the lower brake mean effective pressures.

A very important military advantage in the liquid-cooled Vee type twelve-cylinder engine lies in its ability to fit into a small fuselage and to be supercharged to very high altitudes. The tremendous possibilities of the exhaust-driven supercharger have not been utilized to date but the results so far are outstanding. The exhaust-driven supercharger apparently fits on a twelve-cylinder Vee engine better than on any other type. The direct-driven supercharger requires the same horsepower to drive the supercharger at sea level as it does at its critical altitude, whereas the exhaust-driven type uses only such power as required to maintain the specified intake manifold pressure necessary for the desired total horsepower output of the engine.

This fact gives the exhaust-driven supercharged engine a big advantage in power and rate of climb. The unsupercharged liquid-cooled engine has to date been trying to compete with the supercharged air-cooled engine in military service, a handicap which cannot be overcome until supercharging is applied to the liquid-cooled engine.

Fuel consumption has not received the consideration that it should and the advantage of specific consumption of as low as .39 pound per brake horsepower hour with liquid-cooled engines cannot now be discounted. Full throttle operation of high-powered ground-boosted air-cooled engines is almost always accompanied by high fuel consumptions. Better fuel consumptions can be obtained at cruising speeds than at full throttle, but with the higher volumetric efficiency of the four-valve cylinder with a greater valve area per cubic inch of cylinder displacement, the liquid-cooled cylinder has an initial advantage which cannot be overcome with the two-valve air-cooled cylinder.

The liquids which have been found satisfactory from a standpoint of boiling point, freezing point, and viscosity at various temperatures are ethylene glycol and di-ethylene glycol, the former being selected owing to the fact that it will not freeze at any ground atmospheric temperature providing 5 per cent water is mixed with it. This amount of water will not boil off up to 320 degrees F., so that such a mixture is satisfactory. A fifty-fifty mixture of these two liquids is also satisfactory. These liquids have a tendency to leak badly and extra precaution must be taken to overcome this leakage. Lubrication problems on engine parts are more difficult on account of the higher temperature, and more care must be taken in the construction of radiators on account

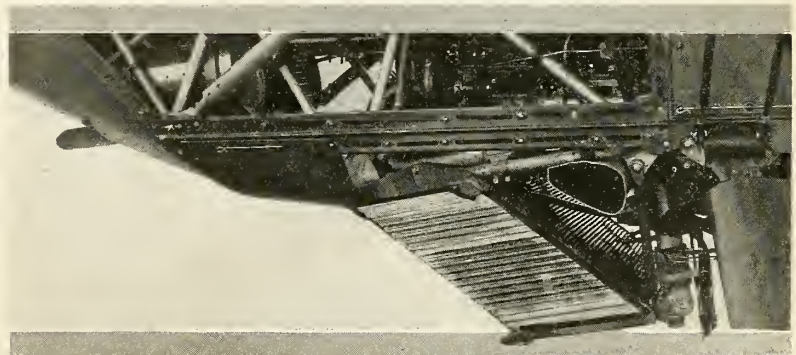


The Conqueror-powered Army Air Corps' P6E Curtiss Hawk, with liquid-cooled engine

of the reduction in strength of the usual solder. In general, the higher temperatures involved are somewhat similar to those experienced in air-cooled engines, and it is, therefore, necessary to change clearances throughout the engine to correspond with these higher temperatures.

It is evident that it is not possible to take an engine which has been developed to run on a coolant temperature of 180 degrees outlet and increase this temperature 50 per cent and expect that the design will be satisfactory. There are a number of difficulties to be overcome. In the first place, the higher temperature lowers the strength of aluminum alloy materials very greatly. It increases the difficulty of cooling pistons and, therefore, more heat is put into the oil which in turn must be better cooled.

With the Vee type of engine, which has low side wall pressure on pistons, no trouble has been experienced with pistons when the proper clearances are used. Adequate oil-cooling can be provided with the unit type oil-coolers, properly baffled to provide the rapid transfer of heat by using sufficient oil velocity through the cooler over the cooling surfaces. These coolers should have adequate bypass valves to permit high pressures from building up when the cold oil is congealed in the cooler. Development of this cooler using the bypassed oil to jacket the cooler to assist in warming up the oil in it during the warming-up period of the engine, is being carried on. The distribution of the oil over the entire surface of the cooler and the proper velocity for this oil is of extreme importance in the design of an efficient cooler. For example, two small cylindrical baffled coolers are more efficient (Continued on page 90)



Prestone-cooled Super-Conqueror engine installation in Curtiss Falcon

# EDITORIALS

## Speed Supremacy

**A**VIATION Speed Foundation, Inc., was organized under Shriners' auspices with Morris E. Miller, Potentate of Al Koran Temple, Cleveland, serving as active chairman. Imperial Potentate Thomas J. Houston has accepted the honorary chairmanship of the Foundation, convinced that a great necessity and a greater opportunity lie in establishing air speed in the United States. That this country, in which the airplane was invented, should trail 151 miles per hour behind the best in speed seems to him and his associates a clear absurdity. To equal, and then surpass, other records will require new airplane designs, new engines and much other technical development, but these can be achieved if money and enthusiasm for these purposes are organized as Aviation Speed Foundation proposes to organize them. We must regain supremacy in the air, and with true public spirit, Speed Foundation intends to help us do it.

Public announcement that the Shriners had become interested in this speed movement, through this specially organized corporation, was made only a short time ago, but the interest which instantly became widespread promises much for the future.

A number of Shriners resident in the air-minded city of Cleveland have shouldered the responsibility of spreading the idea and its merits, inviting every American citizen, whether or not connected with the Shriners (indeed, disregarding race, creed and color) to join the endeavor for purely patriotic reasons.

The Foundation asks no organization for a levy on its membership. Its funds for the proposed five-year program are raised entirely through popular voluntary subscription. The Foundation is not allied with any individual, manufacturer or source of supplies.

The Hon. David D. Ingalls, Assistant Secretary of the Navy for Aeronautics, has accepted the chairmanship of the Advisory Committee which will direct all technical matters; Major Albert Bond Lambert, of St. Louis, has been asked to head the Plan and Scope Committee; Clifford Henderson, manager of the National Air Races, has accepted chairmanship of the Extension Committee.

Headquarters are in Cleveland, with Robert A. Bishop, vice president of the Central National Bank, treasurer.

Headed by such men, and with such backing as the Shriners can and do assure, we can expect to have brought back to this country the speed record we lost through apathy and lack of concentrated effort.

## Remember Air Mail Heroism

**A**ERO DIGEST reminds Congress that H. R. Bill 101, approved February 14, 1931, provides for the award of the Medal of Honor to "any person who, while serving as a pilot in the Air Mail Service, since May, 1918, has distinguished or who, after the approval of the Act, distinguishes himself by heroism or

extraordinary achievement while participating in such service."

Let's not rest satisfied with having put this measure through. It now is our duty and privilege to remind Congress to carry out its meritorious provisions whenever there is true occasion for so doing.

Many deeds of daring, devotion, and sacrifice which have not been rewarded were performed by air mail pilots. Those which come brilliantly to light in the future probably will be promptly recognized. It is only fair to see to it that those which might remain unknown to the world, unrewarded, (because heroism has become routine with our mail fliers) shall be brought to the Congressional attention.

## Our Lighted Airways

**T**HE least objectionable of military preparations are those developments of peacetime activities which will be useful not alone in giving us prosperity and progress while we are at peace but will serve if we be forced to act in self defense. Of such doubly valuable facilities lighted airways may be ranked as most efficient and infinitely the most useful in peacetime for the money spent.

When the United States engaged in the World War, movement of military planes across the country was dependent almost entirely upon the skill and training of the fliers, without aid from the ground. No effective means of systematic communication with the ground existed. Radio was very slightly utilized; ground panel systems of signaling had been devised, but these devices were crude. At night, planes stopped or pilots took their chances.

A great betterment has come, improvement in airways having been as great as improvement in planes. Mass movement of planes along aerial highways is being regularly accomplished. The nation is interlaced from coast to coast with aerial routes. We are well equipped, although, of course, we know of many other things which need to be done.

The nation will have 25,000 miles of lighted aerial routes when the Department of Commerce completes its present program. These not only serve air mail and peacetime needs of our military flyers, but assure some measure of military aerial efficiency in case of war. We need the whole program quickly and, after that, extensions and additional facilities. An airway system provided with beacon lights, intermediate landing fields with lighting equipment, radio range beacons, radio and other communication systems and weather reporting service cannot but be a vast national asset.

We have about 1,300 civil airports municipally or commercially operated and these have an immense defense significance though their intent be non-military. Constituting terminals for air transport, they are comparable with docks, railway stations and harbors. When 700 planes were concentrated on the Eastern seaboard last May, ships were brought from every section of the nation and all were served upon their journeys by the Federal Airway System. Radio, weather reports and port personnel were available when needed. Almost every portion of the country had airways equipped at least for day flying and a large part of the nation had routes ready for night flying. Aerial routes are available to nearly all military air stations and must be extended to all. We must not let this

(Continued on page 95)



# PERSONALITIES



A REPUBLICAN friend of mine asked me why I didn't run a picture of President Hoover in this department, because with the elections coming along he'd naturally appreciate any publicity he could get. Well, I said that from the viewpoint of a Democrat he'd had enough publicity now, of one sort or another, and that I'd sooner devote the space to some hungry Democrat. Besides, the only good picture I had of the President was that one showing him buying his Christmas presents in the five and ten; and there was nothing remarkable in that, as all of us had bought our presents at the same place last year.

Then the President got busy with this two billion dollar Reconstruction Finance Corporation, which I understand is to rehabilitate deserving Republicans whose finances need overhauling, so I thought I might as well sound a friendly note to the administration. My own finances badly need reconstructing, and if anything is to be done for Republicans in my condition, there's no sense in my shouting too much about Democracy and Jeffersonian principles. If they're going to hand out anything, I'd even be willing to be mistaken for a Republican myself.

So when Jim Ewing, America's foremost air race announcer, sent me this picture of Dr. John D. Brock and President Hoover staring contemptuously at a Democratic news photographer, I thought to myself, "There's the picture that I'll run to get myself in solid with the administration. No telling what I'm in line to get now. At the very least Congressman W. Frank James, Republican, of Michigan will send me a copy



Dr. Brock (left) and President Hoover

of the Congressional Directory to hang out back as a sort of *aide de camp* to the Sears Roebuck catalogue. It pays to be thrifty."

So with that thought in mind I'm very glad to shove President Hoover, Doc Brock, and a piece of the White House in here. The Doc is a Sportsman Pilot (we use capital letters now for everyone who pays for his flying) and he's been at it since 1922. He has around 3,000 flying hours without pay, which is said to be more time than any other pilot ever flew for nothing. By the way, I'd like to hear from any Sportsmen Pilots who have piled up a lot of time at their own expense. I'll write them up as public benefactors. If President Hoover got so much credit for feeding a flock of Belgians, we should not overlook charitable pilots who feed deserving air mechanics and aircraft manufacturers. I wish more would do it.

Two years ago last November Doc Brock decided to try flying every day to test Fairfax Airport for year around use, since when he has flown every day not only at Fairfax but from several hundred other airports. To do that, of course, he's had to fly in some bad weather, though I imagine he hangs pretty close to the home port on an especially bad day. I hope so, anyhow. There's no use in a pilot's casting himself away merely to prove that an airplane *can* go up and stagger around in a fog. Keep it up long enough and you're going to run out of proof. And out of print, too, after the final announcement.

One day, on a return trip from Washington, Doc Brock was forced down by bad weather and landed in a pasture near Crab Orchard, Kentucky. He found that he had landed by chance less than a mile from the house in which his father had been born. And when he got a good look at Crab Orchard, Kentucky, he agreed with himself that he had been

wise to emigrate to Kansas City, Mo., where he owns an optical company and three airplanes. He is a director of the Kansas City Chamber of Commerce, and one of the leaders of the Aeronautical Committee of that august body. He is also State Commissioner of Aviation and a Major in the Specialist Division of the Air Corps Reserve, which is pretty good progress for an old emigrant from Crab Orchard, Kentucky.



THE determined-looking gent with the dead animal snuggled in his arms is that old huntsman of the plains, Lee Miles, Chief Pilot, when this picture was taken, for Stinson-California Co., Burbank, California. The boys change around so much these days that it's never safe to say just what they're chief pilot of. I wrote up a friend of mine last year and said he was chief pilot of a certain company—and the next thing I knew I got a letter from him telling me that he was chief pilot of a vacuum cleaner that he was selling from door to door.



Lee Miles

Miles left Burbank in a Stinson Junior and flew 200 miles from Los Angeles, landing in a meadow in the mountains, at an altitude of 7,000 feet. This deer you see here, unaware of the progress of aviation, was contentedly cropping grass, and never suspected that anyone from Los

Angeles would get up there to shoot it. But Miles, taking pity on a poor animal that had to live 200 miles from Los Angeles and never got to the movies, up and shot it and put it out of its misery. There was some talk of giving him the Humane Society medal for this good deed, but instead it was presented to another hunter who shot a radio announcer.

Lee completed in six hours a 200-mile and return flight, allowing two hours for hunting, that would have taken five days by automobile and pack-mule to accom-

lish. That's certainly telling the wild life of America where it gets off. You know, the automobile accounted for all the game within a hundred miles and 2,000 feet altitude of any city. And now the airplane is mopping up all within 200 miles and 7,000 feet. In a few years the only denizens of the wild to survive will be those who have taken a course in how to disappear in an instant, or render themselves invisible with camouflage. They tell of a party of hunters out on Long Island who scared up an animal they thought at first was a giraffe sitting down. But it turned out to be George Wies standing up.

THE savage looking lad is Pilot Garth T. Morris, snapped after an hour's intense study of the future of aviation. Studying the future of aviation always puts a look something like that on the face of a pilot, and in this instance it resulted in the thinker beating it for the oil fields, where, he tells me, he is making more money than he made in the noble art of bargaining along with the birds.

Garth was injected into aviation at the tender age of nine years, at Wilkes-Barre, Pa., when someone took him for

a flight in a Curtiss flying boat. This was in 1918, so by a little arithmetic we arrive at the conclusion that Garth is 23 now. At the age of 15 he started to learn with Paul Redfern, at Toledo, Ohio, for whom he worked as a mechanic. "I became," he says, "a full-fledged member

of the Oily Birds, an organization composed of those who took their daily bath of castor oil behind a buzzing Le Rhone rotary engine, said engine being installed in the front end of Mr. A. V. Roe's famous Avro of the vintage of 1917. Redfern and I barnstormed Ohio and Indiana with the Avro and an old OX Standard."

Paul Redfern, you remember, took off from Brunswick, Georgia, for South America, was sighted by a steamer some 200 miles off the coast, and then was never seen again. I believe he was the first of a long list of pilots who disappeared into oceans. Or was he?—There have been so many that I can't remember who followed who. Certainly there have been more than enough. It is sometimes well to recall the words of General Wolfe, dying on the battlefield at Quebec, "The paths of glory lead but to the grave." Still, that's where all

paths lead eventually, whether glorious or not, so perhaps we needn't be so concerned about surviving to tramp a long time.

As we grow older, and our step slower and more faltering, we begin to wonder why we've been so confoundedly anxious to hang on here; why we haven't taken more chances and got further—even at the possible cost of being snuffed out in the attempt. However, I have long since given up trying to dig any meaning out of this funny old bag of tricks we call life. Personally, I want to hang on so long as I find it even slightly amusing, and leave in a hurry when it grows too tiresome. When it does, I'll simply state that I'm going to give evidence against some racketeer, and next evening I'll find myself comfortably, cheaply, and expeditiously bumped off.

Let's see—we left Garth Morris barnstorming. Well, we might as well leave him there, for that's what he did for the next few years. He put in a season with Carl A. Dixon in Hartford, Conn., going back to Toledo to help Russell J. Holster with his plans for a non-stop flight over the Pacific, which didn't get anywhere, and then flying to the great South-west, where he noticed that oil men almost invariably had more cash than pilots. This discovery was a turning point in the life of Morris. He got a shovel or a sponge or whatever it is you use in mopping up oil, and is using it in Oklahoma City, home town of Bob Garland, another pilot who started with an oil-can. Garth is now happy and contented among the derricks.

OLLIE MacGEARY, a parachute jumper who made one especially daring jump into matrimony, nominates for the hall of fame a very modest pilot named H. Charles Hastings, whose quick thinking probably saved MacGeary's life. "Last year while making a parachute jump," writes the rescued MacGeary, "the chute became fouled and I was unable to shake it out. As I was only using a single pack, it probably would have meant certain death to hit the ground as fast as I was going.

"I had bailed out at 2,200 feet altitude and was descending like a bat out of hell with my chute strung out above me, but fouled in a ball. Hastings put his ship in a power dive, caught me at about a thousand feet with his slip stream, and blew the chute open. Thanks to him I can write this now."

That was not only quick thinking on Hastings' part, but a good demonstration of courage, for he was flying an ordinary commercial ship which was not stressed to withstand 1,200-foot power dives, like an Army Pursuit—a fact of which Hastings was well aware, though possibly he forgot it at the moment. I wrote him about this life-saving incident, to which he replied:

"Wish to advise that MacGeary makes a Hell of a lot of fuss about nothing. I told him not to say anything about that incident. I haven't seen him for some time. He took my advice and got married and quit jumping; that is, he took my advice about *jumping*.

"Mac says I saved his life. Maybe I did but anyone would have done the same. I unloaded him at 2,200 feet. He made about 400 feet delay then pulled the rip cord. The chute came out O.K. but was tangled up so that only three panels opened and the center one split from skirt to vent and the other two did not seem to be doing much for Mac. I went downstairs after him and caught him at about 1,000 feet, kicked my tail towards him, the chute popped, and Mac landed and that's that. I was so damn excited I almost cracked up landing.

"There isn't much to say about myself; nothing ever happened worth writing home about. Started fooling around with airplanes in 1927, was just getting organized when I had an argument with a Mack truck. I was in a Ford; result, three months in a hospital. I started flying again early in '28 and have been flying since that time.

"J. P. Jones taught me to fly in a Pitcairn PA-3. I stayed with him at Lancaster Airways until 1929, went to Harrisburg with the Beaufort Flying Service where I had my first accident, blew out a tire and bent a landing gear strut bouncing over a fence on a forced landing; but that was a little better than hanging the crate on the fence. Worked at Pottstown, Pa., several months, and returned to Lancaster as Flying Instructor. I'm 24 years old and don't have much experience, somewhere around 1,000 hours. My ambition is to get on a passenger run or Air Mail, but I guess I'll die of old age before I get good enough for that."

You know, a letter like that makes me feel better about the human race. Here's this young pilot who says, "I don't have much experience—somewhere around a thousand hours." And how frankly he mentions his crash. Most of us hate to admit we've even blown out a tire. He is certainly a cheering contrast to many young gentlemen with about a hundred hours who seem to arrive at the conclusion that they are completely fortified with all the experience in the world.



Garth T. Morris

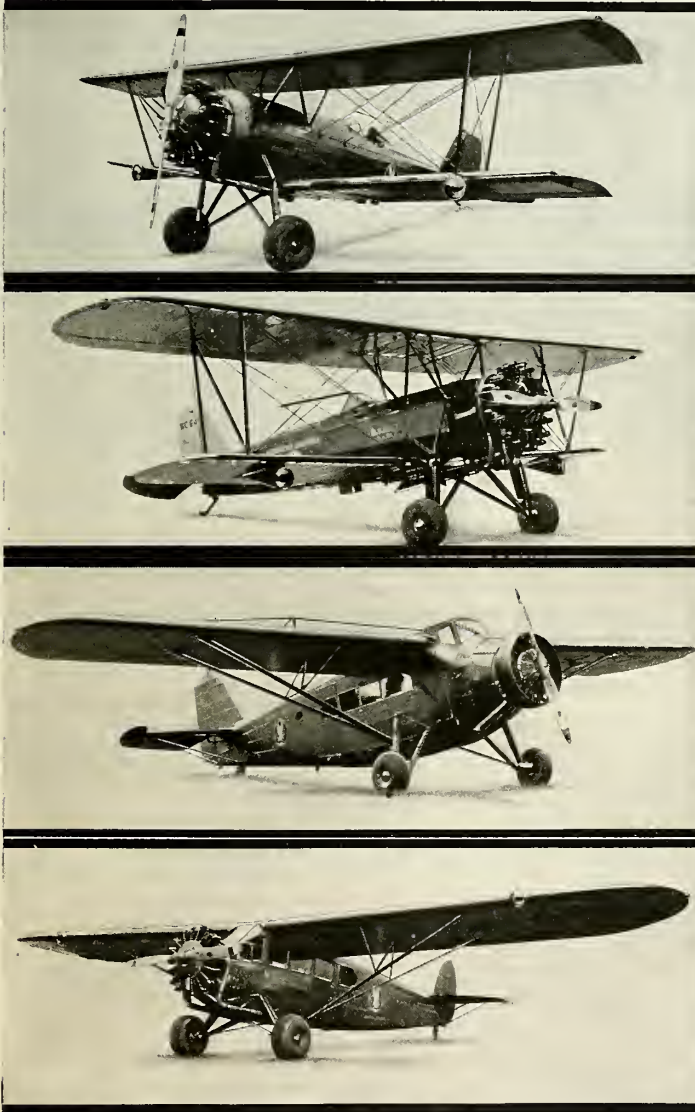


H. Charles Hastings



# AMERICAN AIRWAYS

## USES AIRWHEELS *on Mail and Passenger Ships*



Here are four different types of ships equipped with Airwheels, and there are many more with this same equipment in the great fleet of American Airways, with its scheduled flights of 28,826 miles per day.

With these great, yielding rolling cushions on their landing gear, planes have a new independence over ground conditions, because they can land safely in mud, sand and soft terrain where any other type of equipment would make landings hazardous.

More than this, they reduce maintenance costs, protect planes from many repair charges, such as damage due to ground loops, and give passengers a new feeling of comfort and security in landing and taxiing.

Only Goodyear builds Airwheels. Only Goodyear can give you Airwheel safety. For full data and engineering recommendations, write or wire Goodyear, Akron, Ohio, or Los Angeles, California.

*When you buy a new ship specify  
Goodyear Airwheels*



# GOOD YEAR

**EVERYTHING IN RUBBER FOR THE AIRPLANE**

# OUR READERS AIR THEIR VIEWS

**A. L. Rushton of Nebraska urges that aircraft manufacturers consider the requirements of business men for airplanes suitable for practical uses rather than more spectacular craft:**

The average private pilot-business man is not looking for a professional ship, with special maneuvering ability, high top and cruising speeds, but is looking for a safe, stable ship with landing speeds low enough to permit setting the ship down in small, cramped fields near his destination and getting the ship out of them again, when his business is transacted.

Most pilot-business men fly their ships on business trips for two reasons: First, they prefer flying to taking a train or driving; second, the airplane effects an appreciable saving in time. A ship with the above speeds would satisfy the demands of safety and at the same time would save considerable time in most instances.

**Fear of depression is diagnosed as aviation's worst disease by Dr. Harold W. Trott of New York:**

During the last month many incidents have given aviation a slight poke in the ribs. The greatest trouble today, nevertheless, is, I believe, fear of the good old depression that has been with us since 1929.

The fact that aviation activities have not suffered even as greatly as most other producing industries does not seem to give any encouragement to the pessimists. They carry the contagion of fear and discouragement with them, spreading it as they go. The worst of it is that it takes a ton of encouragement to cancel a pound of pessimism. Fear is a disease far worse than pneumonia. It is the thing that blights the whole world at the present time.

In recent months many owners of various aviation representations have lost courage. They are going out of the business, going to sacrifice their holdings and do something else. What that mysterious "something else," which is more profitable than their past business, may be, is never defined.

The end of the depression will have little meaning for those who have no merchandise to sell on improved markets. Those who take advantage of the present situation to enlarge their field of prospects and to improve their quality of production will lay the foundation for large profit.

There are thousands of business men today that are air-minded and have back in their minds the intention of owning a

plane some day. These men are all at present sick with a very severe and malignant malady. Most of them will survive. How many aviation instructors and salesmen will be waiting to greet them?

**C. P. Craig of West Virginia protests against the lack of protection for passengers in airplanes that are not fire-proof:**

Recently the newspapers carried an account of the finding of a transport airplane, missing for several days in the mountains, wrecked and burned.

Airplane designers and builders may have some reasons for not building fire-proof planes, and if they have, I'd like to know what they are. Some "all-metal" planes are being built, but inflammable materials are used to a great extent in interior finish.

Of course, it is possible to have some sort of escape hatch or extra doors, so that passengers can get out quickly, but we should go one better and make the plane fireproof. Gasoline is responsible for the fire, and no doubt with the improvement of the Diesel type engine, using a grade of fuel not so easily ignited, the fire hazard will be lessened. However, I still believe that planes can be built to use gasoline in the engines and not burn when they crash.

**A warning to American pilots to be wary of Chinese aviation offers comes from a reader in Shanghai, whose name is withheld, since he is yet in the employ of the Chinese Government.**

A situation is turning up in China which has already worked out to the disadvantage of a number of American and Canadian aviators and will work badly for many more if not immediately corrected. Over here it has been rumored that in the United States and Canada a number of posters and articles have appeared, telling aviators to come to China and work for the Chinese Government, that there are plenty of jobs and that the pay will be \$1,000 per month. I have not been able to determine whether this \$1,000 is understood to be in United States gold dollars or in the local currency, which would make the salary equivalent to about \$250. The present exchange is one Mex dollar, which is equal to twenty-five cents in United States currency.

In the past, two American aviators have secured jobs flying for officials of the various Provincial Chinese govern-

ments. One is Harry Smith, flying for the Minister of Communications, and the other is Perry Hutton, flying for the young Marshall. Outside of these two, there is no other that I know or have heard of working on a steady salary. Jobs here as well as in the United States are very scarce, and it is utter foolishness for American or other aviators to come here, being carried away by any promises they may be offered in the States.

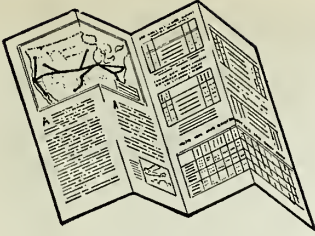
I know of a number of cases where a lot was promised, outside of the facts contained in the written contract, which did not materialize after the pilot had arrived here and started working. My advice to a pilot in accepting a foreign job is: Accept no verbal agreements; salary should be guaranteed on a basis of United States dollars and at not less than \$400 per month; transportation guaranteed upon completion of his job; vacation of three months should be provided for, with return transportation for pilot and his family to his home at the end of three years, or cash equivalent should be provided, in case the pilot has completed his tour and accepted another job.

I trust that you will understand that I am writing this letter purely in the interests of aviation and the pilots. I don't want to see a number of boys from home come out here and suffer hardships.

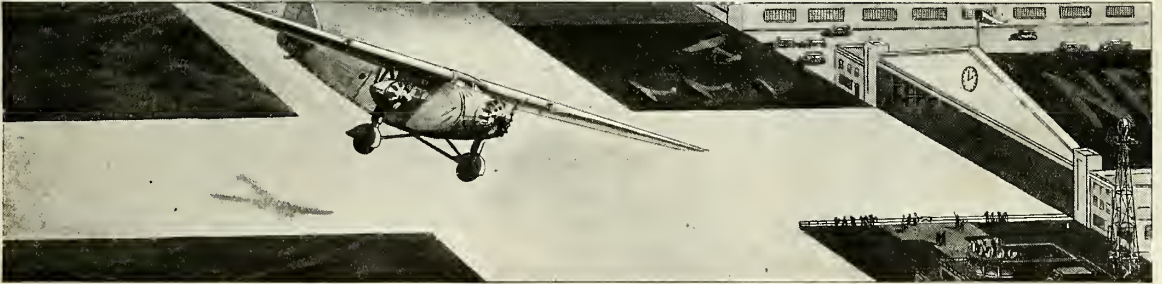
**Department of Commerce examination of aviators about to take an extended flight over unfamiliar territory is recommended by Deane Cunningham of Maine as a preventive of irresponsible publicity stunt trips:**

After flying in various sections of the United States for nearly seven years, during that time carrying thousands of passengers on short joy rides and cross-country trips, all this time explaining to the public that flying was safe and at the same time getting a lot of satisfaction from believing I was doing good for the future of aviation, I attend a show where the news reels blare out to the audience the start of the fatal trip of two young women who it is hard for me to believe were capable of such an undertaking. That sort of publicity does more harm to aviation than the industry is capable of standing at the present time.

The Department of Commerce should have the power to examine the pilot and navigator, when they propose a long flight over strange territory, to ascertain their ability for such an undertaking. In so doing, they would help eliminate these needless fatalities.



# Flying schedules call for swift communication between airports



**Teletypewriters send *written* messages to 2 or 20 points at the same time...whether they are 300 feet or 3000 miles away**

IT IS 10 O'CLOCK. The dispatcher signals, "All Clear." There is a whirr of motors, and the huge air liner soars into the sky. In front of the pilot is a type-written sheet giving last-minute weather reports gathered from points along the entire route by Teletypewriter. . . .

The 2 o'clock plane is ready to leave. There is an unexpected call for seats at a city 90 miles ahead. Arrangements are made by Teletypewriter to release space originally reserved for another city, where the day's demand proves lighter. . . .

An important express shipment is carried on the 4 o'clock plane. It is essential that it be delivered to the consignee immediately upon arrival. A Teletypewriter message explains all details. . . .

Teletypewriters provide the swift, *written* communication between airports that is so necessary in the successful operation of air lines. A message typed on one machine is identically reproduced at the same moment by all connected machines. The typewritten records guard against mistakes.

This continuous, two-way contact helps to maintain the accuracy of schedules. It is an ideal medium for sending executive instructions; passenger lists; traffic details; accounting matters; freight information.

Teletypewriter Service is now used by the following manufacturing and operating companies: Department of Commerce (Airways Division), Transcontinental-Western Air, Thompson Products, Century Airlines, Ludington Line, Eastern Air Transport.

Your local Bell telephone company will gladly give you complete information about Teletypewriters.

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TELETYPEWRITER  
SERVICE**



*The recently announced Teletypewriter Service permits any subscriber to it to type-write by wire instantly to any other subscriber, whether he be around the corner or across the continent. This service differs from private line Teletypewriter Service, described on this page, in that any subscriber may ask for any other subscriber and be connected immediately by the teletypewriter "central."*



**TELETYPEWRITER SERVICE**

# Air Transport Operations for 1931 Compared with 1930

**T**HAT 1931 was a peak year in the history of air transportation was shown in recently released statistics compiled from Department of Commerce figures. The statistics were taken from monthly reports of American airlines open to public use and operating scheduled services in the United States or from the United States to foreign countries.

Aided by approximately 17,500 miles of lighted airways out of a total of 50,000 miles of established routes in the United States and neighboring countries, American air transport operators increased their activity to scheduling 130,000 miles per day, on the average, instead of less than 90,000 miles per day, as in 1930. The total scheduled mileage for the year was 47,463,673, as compared with 30,703,119 in 1930, an increase of 54.5 per cent.

A total of 43,395,478 miles was flown in scheduled operations in 1931, an increase of 50.5 per cent, compared with the 28,833,967 flown in 1930. In 1931, 91.4 per cent of all scheduled mileage was actually flown, compared with 93.9 per cent in 1930. The low point for the year was the month of February, from which monthly flying activity rose to a peak in the summer or early fall and then declined as winter approached. In 1931, the exceedingly mild fall and early winter encouraged operators to maintain their schedules at mid-summer levels, but actual weather conditions in November and December caused nearly 20 per cent of the scheduled mileage to be cancelled.

Passenger traffic, which lagged behind



Mail compartment in the starboard wing of an N. A. T. Ford trimotor

1930 during the first part of 1931, exceeded all monthly records from June to December, inclusive, with an annual total of 18.6 per cent in excess of 1930. A total of 457,753 passengers was carried on scheduled airlines during the past year, as contrasted with 385,910 in 1930, 165,263 in 1929 and 52,934 in 1928. Passenger traffic, starting at a low point in January, reached the peak in August and September, falling off rapidly during the last three months of the year to a level slightly above that of January. On the average 38,146 passengers were carried per month in 1931. While the number of passengers carried was increased 18.6 per cent in 1931, passenger miles increased 22.9 per cent, showing that individual trips were slightly longer on the average. In 1931, when 116,232,153 passenger miles were flown, the average passenger flew 254 miles. In 1930, when 94,545,784 passenger miles were reported, the average passenger traveled 245 miles.

Air mail averaging nearly 780,000 pounds per month, or 9,351,195 pounds

during 1931, was reported. This was 10 per cent above the total reported in 1930, when 8,513,675 pounds were carried by all lines, including those running to Central and South America. The low point for the past three years has been in February, rising to a modest peak in October, with a sharp drop in November.

A total of 885,164 pounds of air express was carried by air transport companies in 1931, as compared with 286,798 pounds in 1930, 197,538 pounds in 1929, 35,376 pounds in 1928 and 12,495 pounds in 1927. Many airlines are studying the potentialities of the air express business, and special inducements have been offered in many cases to attract business. A large fraction of the total express poundage reported in 1931 was carried under special arrangement with shippers who desired to move large quantities of goods with a low unit value, an impossibility with the standard rates usually charged. Part of the total amount was reported by new lines, either specializing on carrying passengers and express or so situated that other means of transportation did not offer much competition. The remainder of the airlines which compete with other means of transportation and yet seek to develop the air express business reported a satisfactory increase in 1931.

With a fifty per cent increase in mileage flown, a corresponding increase in the consumption of gasoline and oil would be expected. Gasoline consumption increased 65.5 per cent, from 10,835,050 gallons in 1930 to 17,939,051 gallons in 1931. The increasing use of large multi-motored transports and the supercharging of engines probably contributed to make this increase slightly greater than that of miles flown. Oil consumption increased 62 per cent, from 332,340 gallons in 1930 to 538,269 gallons in 1931.



Loading air express packages aboard a trimotored Boeing of United Air Lines

# AMERICAN STEEL SHEETS

## Serving in the Conquest of the Skies



**KEYSTONE Rust Resisting Copper Steel SHEETS**  
FOR AIRPORT BUILDINGS, HANGARS, SHOPS, SHEDS, TANKS, CULVERTS, ETC.

**I**n the growing aviation industry, AMERICAN Steel Sheets are called upon for most exacting and important service—because these Sheets are dependable and meet qualifications that are necessarily strict.

KEYSTONE Quality (steel alloyed with copper) is unexcelled for all outside uses. Culverts of this material make drier, safer landing fields. Hangars, shops, and sheds of KEYSTONE Quality are fireproof and durable—and for all uses in construction or equipment to which sheet metal is suitable, there AMERICAN Sheets excel and render excellent service.

We also manufacture



**STAINLESS**  
and Heat Resisting  
**STEEL SHEETS**  
AND LIGHT PLATES

AMERICAN products include a complete line of Steel Sheets and Tin Plates for all known uses. These products have long been the choice of railroads, automobile makers, and the construction interests—and now command favor in the aviation field.

Supplied in Black Sheets, Galvanized Sheets, Galvannealed Sheets, Formed Roofing and Siding Products, and Special Sheets for Special Purposes; also Tin and Terne Plates. Sold by leading metal merchants. Write for interesting booklets and information.

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## CURRENT AIRPORT AND AIRWAY FACTS

### Thompson Announces \$10,000 Profit

THOMPSON Aeronautical Corporation, including the subsidiary, Transamerican Airlines Corporation, has revealed a net profit of over \$10,000 for the year ending December 31, 1931. The first profit year in the five years of flying operations by the company, 1931 progress was reviewed in the annual report of R. C. Marshall, president of the Thompson concern, to the stockholders. Transamerican Airlines links eighteen Middle Western cities with U. S. air mail, passenger and express lines, while the holding group, Thompson Aeronautical Corporation, operates a Great Lakes sales-service chain of eight aviation bases.

President Marshall's report also disclosed that Transamerican Airlines is continuing its study and plans for the proposed 4,369-mile air route, linking America and Europe via Greenland and Iceland, with terminals at Detroit, Mich., and Copenhagen, Denmark.

Transamerican Airlines will supplement its present Cleveland-Toledo-Detroit service on April 1 by resuming operation of its 55-minute Downtown Cleveland-Downtown Detroit amphibion trips, which have been suspended for the winter season.

Officials of Thompson Aeronautical Corporation recently announced that the general offices, maintained in Cleveland since 1927, would be moved to Detroit about March 1.

### Business Man Flies 10,000 Miles in Year

C. P. CLARK, advertising manager of the Jarman Shoe Company of Nashville, Tenn., flew nearly 10,000 miles in 1931, and spent ninety-three hours in the air.

In a detailed log of his business trips, which were always by air where air transportation was available, Mr. Clark shows that he saved 225 hours of traveling time by flying. He would have spent 318 hours en route on surface forms of transportation. Most of his mileage was on American Airways routes which serve Nashville.

Mr. Clark's itinerary included sixteen cities, from Columbus to Jacksonville and from New York to Dallas. He used six different airlines, and flew twenty-one hours in October, his biggest travel month. He spent \$592.43 on air travel, a little over six cents a mile.

### Frequent New York-Washington Trips

COMMUTATION by air on regular schedules forty times a day between New York and Washington will be inaugurated in April by The Ludington Airlines, Inc., which means an increase

on schedules at that time from one trip every hour (on the hour) to twenty trips daily in each direction—or one practically every half hour—the most frequent schedule in the history of air transportation.

In explaining the reason for the new half-hourly schedule, President James M. Eaton of the company pointed out that since the existence of the hourly service over the New York-Washington route, a period of only seventeen months, more than 90,000 passengers had been carried, said to be the largest number ever transported in a similar period of time by an airline transport company.

A special feature of the new schedule will be the establishment of fast non-stop trips, requiring but two hours between midtown New York and Washington. All passengers will leave Pennsylvania Station on the hour and half hour in Ludington limousines, connecting with planes at Newark Airport. Departures on the hour from the Pennsylvania Station will include stops at Philadelphia and Baltimore as at present, while those starting on the half hour will be non-stop.

### Divisions of American Airways Unite

F. G. COBURN, president of American Airways, Inc., has announced that the two central divisions of American Airways will be combined as of March 1, 1932. All routes, schedules and services will be continued as at present. John Paul Riddle has been appointed to the department of operations at the central office of the company in New York. Col. Halsey Dunwoody has been designated to direct the operation of both present central divisions.

### Demonstration of Air Transport Progress

A GROUP of graphic charts on air transports, prepared by T. Park Hay, an executive of Transcontinental and Western Air, Inc., reviews in twenty minutes in an entertaining and visual style air transportation, from its inception to the close of 1931, which in spite of the depression showed increases in all lines of transport activities.

The chart series is presented before traffic clubs, chambers of commerce, Rotary and Kiwanis clubs by T W A officials, assisted by officers of the Postal Telegraph Company. It illustrates the commercial side of aviation in such a way that many of these bodies are expected to list the subject among the important questions to be watched and studied.

Showing that over \$500,000,000 is invested in aviation, the series reveals the rapid growth of the transport system during the past few years. It discloses

at a glance the whole network of airlines in this country, where and how they operate, the passengers and cargoes they carry, and a complete array of all the modern instruments that are contributing daily to the safety of flying.

Step by step air travel is analyzed. Its 3,000 per cent growth since 1926 is graphed, and the question is raised, "Will air transport eventually become the accepted means of travel, particularly for long distances?"

Tracing the growth of air mail since its inception in 1911, when the first air mail was flown between two airports on Long Island, to the present system, directly serving 162 cities and carrying in 1931 over 9,500,000 pounds of mail, is in itself an interesting study.

Predicting that air express and air freight will be, before many years have elapsed, the largest activity in air transport, the group displays an interesting picture of the cargoes that are moving by air today, showing numerous ways in which hundreds of shipping and merchandising concerns are using air shipping to save time and reach newly created markets made possible only by the speed of the airplane.

One of the demonstrations in the collection illustrates to what extent the airlines of the country are coordinating their services with the principal railroads and bus lines. The tying in of a nation-wide bus operation of Greyhound lines with a transcontinental airline is shown, suggesting possibilities for working together for the economic movement of passenger and express traffic.

The series closes with two interesting studies. It visualizes the air transport picture in 1937, predicting the number of passengers, tons of mail and express that will be flying in five years. It shows how far America has surpassed England, France and Germany in developing air transport, and it demonstrates in a convincing way how aviation will sooner or later have a very definite effect on every line of business.

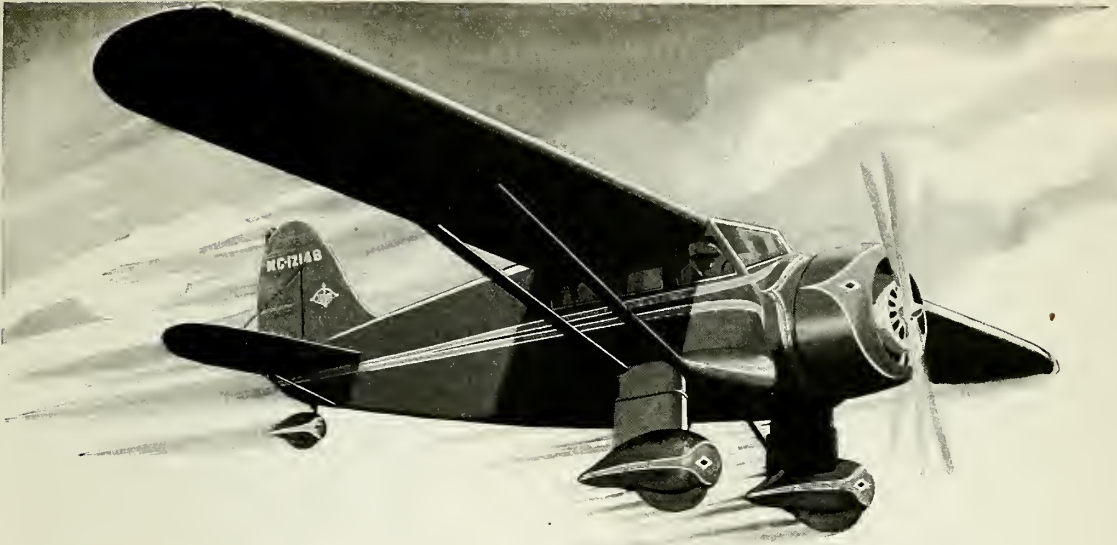
No charges are made for the demonstrations, and while the airline officials wish to visit and talk with as many clubs as possible, they will not always be available to attend meetings at specific times. Every effort will be made, however, to visit groups that want to make this study of air transport.

### Air-Bus Express Service

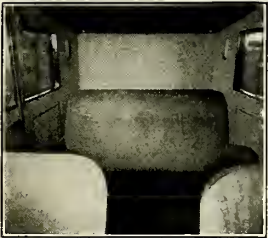
AMERICA'S first combination air-bus express service on a nation-wide basis started February 8 through the co-operation of Transcontinental & Western Air, Inc., and the Greyhound Lines.

The Greyhound Lines make bus connections with T W A planes, hundreds of Greyhound bus stations thus becoming receiving and distributing agencies for this new air-bus express service. The

(Continued on following page)



**MODEL "R" FEATURES**



*Increased comfort, roomier cabin, more headroom and wider, deeper seats set new interior standards*



*Yee windshield, improved vision, new indirectly lighted instrument panel... electric starter easily reached*

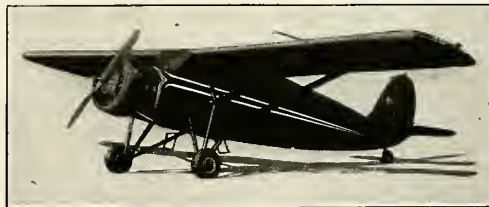


*Wider doors, easier entrance steps, streamlined landing gear... wind tunnel tested motor cowling*

# Buyers Acclaim New Stinson Model "R"

Critical Buyers, backing their judgment with orders for early delivery, acclaim the 1932 DeLuxe Model "R" Stinson Monoplane, powered by Lycoming, to be the best combination of stability, maneuverability and speed with luxurious interior spaciousness, exterior beauty and dependable economy

so far produced in the four-passenger cabin class... The evident quality and superior performance of this new Stinson stamps it as the most outstanding dollar value ever produced at \$5595 at the Factory. Inspect and fly it—THEN if this plane does not sell itself—you will not be asked to buy.



**\$4595**  
f. o. b. WAYNE, MICH.

## THE STINSON MODEL "S"

This sturdy four-passenger cabin monoplane, 215 H. P. Lycoming powered, has broken all cabin plane sales records during the past two years. Wide public acceptance makes it possible to offer this plane, improved in quality for 1932, at this sensational new low price.

TO DEALERS: Increasing demand for cabin plane comfort by both private owners and operators resulted in dealer sales of over 350 Stinson Models "SM-8" and "S" during 1931-1932. The Model "S" at its new low price of \$4595, and the Model "R", new in design and performance, maintain Stinson's leadership in the cabin airplane field, and insure profits to Stinson dealers.

**STINSON AIRCRAFT CORPORATION, WAYNE, MICHIGAN**  
Division Cord Corporation



**More Than Ever "The Aircraft Standard of the World"**

(Continued from preceding page)

bus lines are feeders for the airline, picking up express packages from all intermediate and neighboring centers and bringing them to the airports served by T W A. Rates remain the same as those charged on the T W A system, which has been carrying air express for a year and a half.

The new arrangement allows a shipper in the East or West to ship with either T W A or Greyhound one day and have his package delivered at the other end of the country the following evening. All other cities and towns within 200 miles of T W A airport stops are linked with the rapid air express service. The new air-bus service also includes Postal Telegraph messenger service between airports and Greyhound bus stations and further messenger delivery service to customers on the airline.

Transcontinental & Western Air station stops affected by the new service include New York; Philadelphia, Harrisburg, Pittsburgh, Pa.; Columbus, Ohio; Fort Wayne and Indianapolis, Ind.; Chicago, Ill.; St. Louis, Kansas City, Springfield, Mo.; Tulsa, Oklahoma City, Okla.; Wichita, Kans.; Amarillo, Tex.; Albuquerque, N. M.; Winslow, Ariz.; Los Angeles and San Francisco, California.

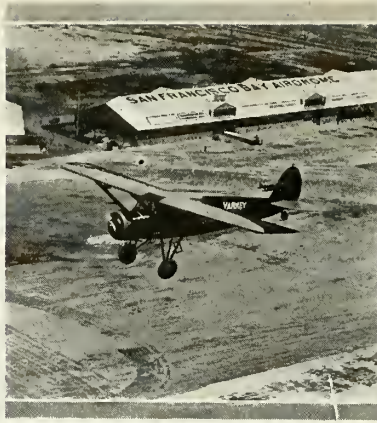
The rapid growth of the T W A-Greyhound coordinated air-bus passenger service, which was started last October, led the two companies to provide the business and shipping fields with this new express service, according to President Richard W. Robbins of T W A and President Orville S. Caesar of the Greyhound Lines.

#### Army Crash Truck

THE LATEST in crash trucks has been acquired by the Air Corps at Bolling Field. Manned by a crew of three, the machine can travel at high speed over rough ground to the scene of a crash, and by means of a special Foamite generator and pumping unit, spray fire-suffocating foam in quantities sufficient to extinguish quickly any gasoline blaze.



Latest type of crash truck developed by the Army Air Corps



#### California Lines' Activities

HEADQUARTERS of the Airdrome Transportation Company have been moved to the San Francisco Bay Airdrome. The company, which operates limousine service between the airdrome and San Francisco, formerly had its base in San Francisco. Joe Ferrant is president.

VARNEY AIR FERRIES has taken delivery of a five-passenger Sikorsky amphibion for use in its proposed service between San Francisco Bay Airdrome, Alameda, and Pier 5, San Francisco. The service will operate on a 16-trip-a-day schedule, according to present plans. A ticket agency has been established in the Ferry Building, San Francisco. Limousine service will carry passengers to the Pier 5 terminal.

ADDITIONAL service was inaugurated between Santa Barbara and Los Angeles, Calif., February 17 by Coast Airways, Inc. Four round trips daily are made between the two cities. On the first and last flights, service is given to Pasadena and Santa Monica, on reservation. Schedules have been planned to

meet all incoming and outgoing planes at Grand Central Air Terminal, Los Angeles, for and from all points North, South and East. Limousine service is furnished gratis at the Santa Barbara terminal.

#### Burbank Airport Statistics

EVIDENCE of increasing aviation activity in Southern California is shown in figures of plane landings, take-offs and passenger records released by United Airport, Burbank, California, for 1931: 30,502 plane take-offs and 30,444 landings are recorded for 1931, as compared with 12,189 take-offs and 12,133 landings for the eight-month period of 1930 operations following the opening of the terminal in May. Passengers boarding planes numbered 60,520 and passengers arriving by plane totaled 59,183 during 1931. Passenger figures for the 1930 eight-month period were: Departing, 22,989, arriving, 23,093.

#### Air Service to Hoover Dam

TRI-MOTOR passenger plane service to Hoover Dam, Nevada, was announced by United Air Lines and Western Air Express. It is possible to leave New York and Cleveland in the forenoon or Chicago in the afternoon and be at Hoover Dam the next forenoon.

#### Salt Lake City Airport

PLANS are being considered to build, at Salt Lake City, Utah, airport, a \$50,000 administration building, financed by the city and then leased, thus paying for itself. The airport is second in America in the volume of mail handled, Chicago being first, and need is felt for a building similar to a union railroad station. Salt Lake will be headquarters for the airways division, Department of Commerce, for four intermountain states, if the administration building is constructed at the airport.

Installation of a new device in the form of a "smoke-pot" to indicate wind directions for the benefit of pilots while landing and taking off at the airport also is being considered by Commissioner Harry L. Finch, who is in charge. Mr. Finch recently inspected the indicator at Burbank, Calif.

The training planes for the 329th observation squadron, Third Reserve area, now at the airport, will be replaced with service planes, according to Lieutenant Clarence E. Talbot, squadron commander. The observation squadron now has two service ships.

#### Salt Removes Snow

SALT, placed on the airport runway at Ogden, Utah, is proving a success in keeping it free from snow, according to Commissioner W. J. Rackham, in charge of the field.





# 110 planes 34 ground stations . . .

equipped with

## *Western Electric Radio Telephone*

by **AMERICAN AIRWAYS** Inc.



Flying over 875,000 miles a month, serving 60 cities from coast to coast and from Canada to the Gulf, American Airways has built up a fine record for dependability. And Western Electric Radio Telephone—by keeping pilots constantly in touch with dispatchers—has helped to make this record possible.

Along the 9,387 miles of airways over which American operates, 34 ground stations have been equipped with Western Electric Radio Telephone apparatus for guiding and instructing pilots en route. And 110 planes are

Western Electric equipped—63 for two-way Radio Telephone communication, 47 for receiving radio beacon signals and Department of Commerce weather broadcasts.

There's Western Electric Radio equipment designed for small planes, too — light, compact and easily installed. For details, write to Western Electric Company, Department 270AD, 195 Broadway, New York.



*Western Electric equipped routes of American Airways, Inc.*

# *Western Electric*<sup>\*</sup>

## Aviation Communication Systems

MADE BY THE MAKERS



OF BELL TELEPHONES

<sup>\*</sup>Northern Electric in Canada

# RECENT AERO PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N.W., Washington, D. C., at the rate of 20c each. State patent number and inventor's name when ordering.

Aircraft. Fritz Bauer, Stuttgart, Germany. (1,838,354)

Airplane. Newell C. Jackson, Cassville, Mo. (1,838,404)

Propeller. William Rosen, Royal Oak, Mich. (1,838,453)

Aircraft. Charles E. Smith, Oroville, Calif. (1,838,457)

Airplane. Joseph J. Friedman, Corona, N. Y. (1,838,478)

Control of air valves for airfoils. Samuel E. Hitt, Elyria, Ohio. (1,838,484)

Airscrew. Spencer Heath, Elk Ridge, Md., assignor to American Propeller Co., Baltimore, Md. (1,838,674)

Rocket-motor airplane. Louis Berkowitz, New York, N. Y. (1,838,984)

Propeller. Frederick H. Davenport, Meadville, Pa. (1,839,013)

Canard type airplane. Joseph Blondin, Los Angeles, Calif. (1,839,194)

Propeller. Eduard Seppeler, Berlin-Newcologne, Germany. (1,839,347)

Wing of airplanes and the like. Frederick Sigrist, Oxshott, England. (1,839,349)

Airship construction. Ralph A. Yelli, Los Angeles, Calif. (1,839,365)

Parachute. Louis S. Rockoff, Chicago, Ill. (1,839,441)

Flying machine. John J. Henry, Mason, Ill. (1,839,556)

Aircraft. Herman Klingaman, Louisville, Ohio. (1,839,563)

Method of determining streamline contours. Charles P. Tolman, New York, N. Y. (1,839,619)

Airplane fuselage and method of constructing the same. Edmond Chagniard and Alexander Kartvelichvili, New York, N. Y., assignors to Chagukart International Aviation Corp., same place. (1,839,645)

Airplane control. Hachitaro Umesaki, Chicago, Ill. (1,839,716)

Aircraft, including swinging stair structure for same. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,839,808)

Propeller. John Squires, Detroit, Mich. (1,839,811)

Variable pitch propeller. Joseph P. Rossi, El Cerrito, Calif. (1,839,895)

Variable pitch propeller for airplanes. John F. Berry, Lewis, Iowa. (1,840,148)

Flying machine. William J. Buchanan, Chelmsford, Mass. (1,840,152)

Airplane. Elmer L. Crozier, Birmingham, Ala. (1,840,159)

Airship sea beacon and service station. Carl J. Lindquist, Brooklyn, N. Y. (1,840,324)

Cabin airplane ventilation. Charles F. Jenkins, Washington, D. C., assignor to C. Francis Jenkins, Inc. (1,840,393)

Airplane. Walter W. Rothenhoefer, St. Louis, Mo. (1,840,531)

Stabilizing and propelling apparatus for land, sea, and air craft. Harold J. Stone, Los Angeles, Calif. (1,840,541)

Braking device for aircraft. Richard Micek, Los Angeles, Calif. (1,840,592)

Airplane. Victor Minor, Leeton, Mo. (1,840,594)

Parachute. Joseph E. Castner, Houston, Tex. (1,840,618)

Airplane. William B. Stout, Detroit, Mich., assignor to Ford Motor Co., Highland Park, Mich. (1,840,643)

Airplane stabilizer. C. Heber Vance, Ontario, Calif. (1,840,683)

Propulsion and steering of airships. Samuel E. Hitt, Elyria, Ohio. (1,840,716)

Airplane landing gear. Harold A. Hicks, Detroit, Mich., and Harold L. Van Alstyne, Watertown, N. Y., assignors to Ford Motor Co. (1,840,900)

Airplane. Harold A. Hicks, Detroit, Mich., assignor to Ford Motor Co. (1,840,901)

Airplane. Harold A. Hicks, Detroit, Mich., assignor to Ford Motor Co. (1,840,902)

Airplane landing device. Frank B. Robb, Cleveland Heights, Ohio. (1,840,973)

Airplane. Rolf F. Vestvold, Haverford, Pa. (1,841,164)

Aircraft hangar and method of building it. Karl Arnstein and Paul Helma, Akron, and Wilbur J. Watson, Cleveland, Ohio, assignors to Goodyear-Zeppelin Corp., Akron, O. (1,841,321)

Automatic variable pitch propeller. Edwin A. Parham, Jackson, Mich. (1,841,497)

Airplane. Jacob P. Sellmer, Stinson Beach, Calif. (1,841,642)

Aircraft carburetor and fuel supply system. Jephtha M. Miller, Chicago, Ill., assignor to Bendix Stromberg Carburetor Co. (1,841,663)

Air flow governing means. Alexander S. Mullgardt, Seattle, Wash., assignor to Boeing Airplane Co. (1,841,666)

Flying machine. John Chodur, Chicago, Ill. (1,841,788)

Airplane. Randolph F. Hall, Rochester, N. Y. (1,841,804)

Aircraft. Charles J. Hughes, Montgomery, Ala. (1,841,815)

Airplane construction. Jacob Spiegel, Philadelphia, Pa. (1,841,921)

Airplane wing. George H. Burns, Jamaica, N. Y. (1,841,936)

Ground speed and course indicator. Homer L. Bredouw, Kansas City, Mo. (1,842,067)

Propelling and steering mechanism. August Schwartz, Chicago, Ill. (1,842,125)

Propeller. Willard H. Kempton, Bridgeport, Conn., assignor to Westinghouse Electric & Mfg. Co. (1,842,178)

Airplane. Theodoro N. de Bobrovsky, Budapest, Hungary, and Ermanno Parenzan, Trieste, Italy. (1,842,250)

Commutator construction. Warren S. Eaton, Los Angeles, Calif., assignor to Eaton Radio Instrument Corp. (1,842,340)

Apparatus for converting or transforming electrical energy. Warren S. Eaton, Los Angeles, Calif., assignor to Eaton Radio Instrument Corp. (1,842,341)

Radiodynamic orientation means and method. Warren S. Eaton, Los Angeles, Calif. (1,842,342)

Method and apparatus for indicating direction. Warren S. Eaton, Los Angeles, Calif. (1,842,343)

Device for measuring electrical energy. Warren S. Eaton, Los Angeles, Calif. (1,842,344)

Radio operated direction indicator. Warren E. Eaton, Los Angeles, Calif. (1,842,345)

Method and apparatus for radio operated steering. Warren S. Eaton, Los Angeles, Calif. (1,842,346)

Method and apparatus for determining direction. Warren S. Eaton, Los Angeles, Calif. (1,842,347)

Landing and take-off apparatus for airplanes. Samuel A. Stratton, Portland, Ore. (1,842,432)

Parachute construction. Edward L. Hoffman, Dayton, Ohio. (1,842,450)

Propeller. Fred E. Weick, Langley Field, Va. (1,842,466)

Device for landing aircraft. Austin P. Carr, Los Angeles, Calif. (1,842,583)

Parachute apparatus. Leslie L. Irvin, Buffalo, N. Y., assignor to Irvin Air Chute Co. (1,842,611)

Airplane. Harold H. Karr, San Diego, Calif. (1,842,613)

Airplane construction. La Verne F. Wertz, Buffalo, N. Y. (1,842,637)

Airplane. Norbert Carolin, Los Angeles, Calif. (1,842,656)

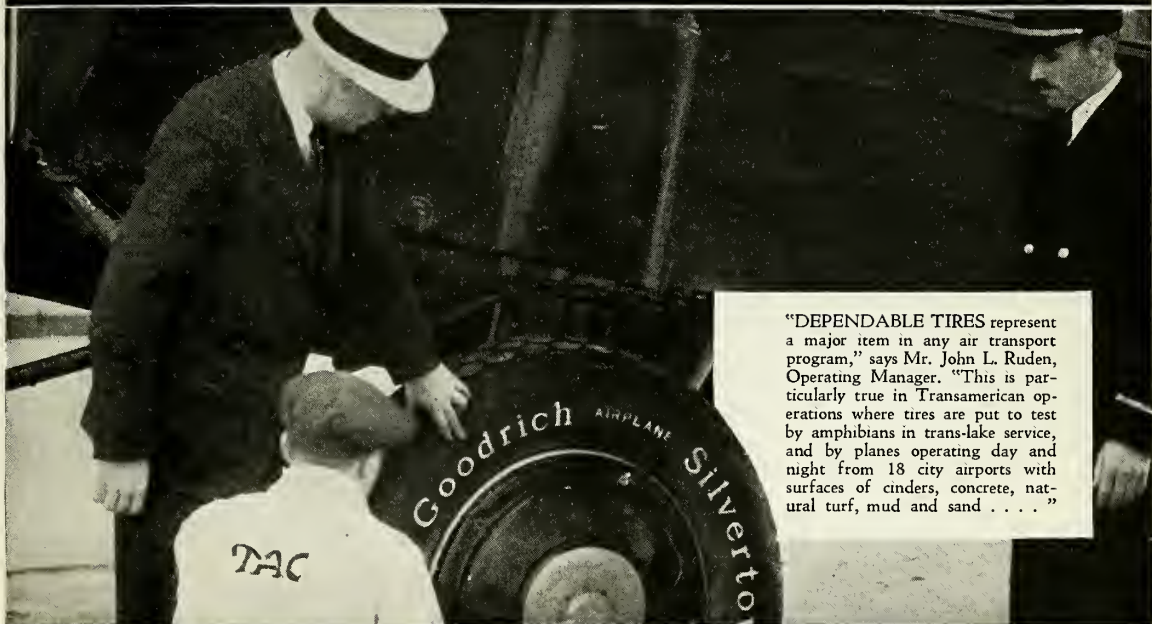
Airplane. John Hall, West Springfield, Mass. (1,842,669)

Device for drying lifting gas for airships. Ernst Besch, Friedrichshafen, Germany. (1,842,710)

Parachute rip cord apparatus. Harvey E. Lafayette, George Waite and Lyman H. Ford, Buffalo, N. Y., assignors to Irvin Air Chute Co. (1,842,723)

Air and water craft and method of making the same. William B. Stout, Detroit, Mich., assignor to Ford Motor Co. (1,842,736)

# ON TRANSAMERICAN AIRLINES . .



"DEPENDABLE TIRES represent a major item in any air transport program," says Mr. John L. Ruden, Operating Manager. "This is particularly true in Transamerican operations where tires are put to test by amphibians in trans-lake service, and by planes operating day and night from 18 city airports with surfaces of cinders, concrete, natural turf, mud and sand . . ."

## As high as 4000 Take-offs and Landings Per Tire

**L**INKING eighteen cities of the middle west industrial area including Chicago, Detroit and Cleveland, Transamerican Airlines is indeed an important factor in U. S. Air Service. Comparatively short distances between points mean frequent take-offs and landings — de-

mand the utmost in durable, dependable tire equipment.

The Goodrich Silvertown Airplane Tires on Transamerican tri-motor airliners are meeting these requirements by averaging 1000 to 1200 take-offs and landings per tire — on single motor planes, *as high as 4000 take-offs and landings per tire!*

Goodrich Silvertown Airplane Tires are the preferred tire equipment of air-men everywhere. In any size they afford the highest quality with minimum weight. A set of them can be easily and quickly installed on *your* plane, with or without brakes.

See your nearest Goodrich Distributor or write to the Aeronautical Division of The B. F. Goodrich Rubber Company, Akron, Ohio, for further information.



A few of the 25 planes in the Transamerican Fleet which has operated nearly four years without loss or injury of a passenger. Map shows main and branch lines and amphibian route between Detroit and Cleveland which maintains a 55-minute service.

# Goodrich Airplane Tires

Another B. F. Goodrich Product



Over 40 rubber products for airplanes • Silvertown Tires • Tail Wheels • Hose • Tubing • Engine Mounts • Crash Pads • Matting • Accessories

# THE PRIVATEER III AMPHIBION

By

P. H. Spencer

THE de luxe 1932 model Privateer III cabin amphibion is replacing the former Privateer models manufactured by Amphibions, Inc., Roosevelt Field, Garden City, N. Y. The new model, powered by a 165-horsepower Continental engine, differs from the previous model in many respects. The aim was to increase its utility and comfort, reduce its maintenance, and yet keep within the same low price class as established by its predecessor.

In the new model P-III, a well-appointed cabin arrangement seats three people. There are the usual methods of adjustable ventilation, cabin sound-proofing and hand-operated sliding windows and windshield wiper. Access to the cabin is obtained by lowering into the sides of the hull large duplex glass windows and raising the hatches which cover a good portion of the cabin roof. The instrument board is composed of standard Pioneer instruments mounted in a detachable panel visible from all seats. Engine and landing gear controls are centrally located between the side-by-side seating arrangement of the forward pilot and passenger seat. Exceptional visibility for a cabin airplane is obtained by the forward location of the cabin arrangement and the elimination of the engine and propeller interference by the pusher type; these features result in clear, un-

obstructed visibility forward, both sides, and above. The usual blindness due to wing interference is almost completely avoided by the location of the pilot ahead of the leading edge of the wing, it being very easy to see both above and below the wing at a glance. A simple device is provided whereby the pilot's seat may be raised and lowered four inches in flight by the movement of a hand lever at the pilot's side.

The usual problem of raising and lowering amphibion gears has been simplified to the extent of the mere moving of a hand lever similar to the conventional gear shift lever in motor cars. The energy usually required to actuate the landing gear mechanism is derived from a Heywood starter tank of compressed air. The principle upon which the mechanism operates is that of the ordinary automobile tire pump, merely attaching the piston or operating end of the pump directly to the retractable landing gear itself.

Heavy Wamsutta duck is used for the sides of the hull, thereby enabling clean-

ness of hull design, which permits better air flows and lessens the drag. Aside from the use of duck for the sides of the hull, it is also used in a lighter weight to cover other portions of the hull and tail boom. The use of all fabric eliminates the possibility of corrosion, and one who is familiar with canoe construction or the use of canvas for sails can testify to its long life and wearing qualities.

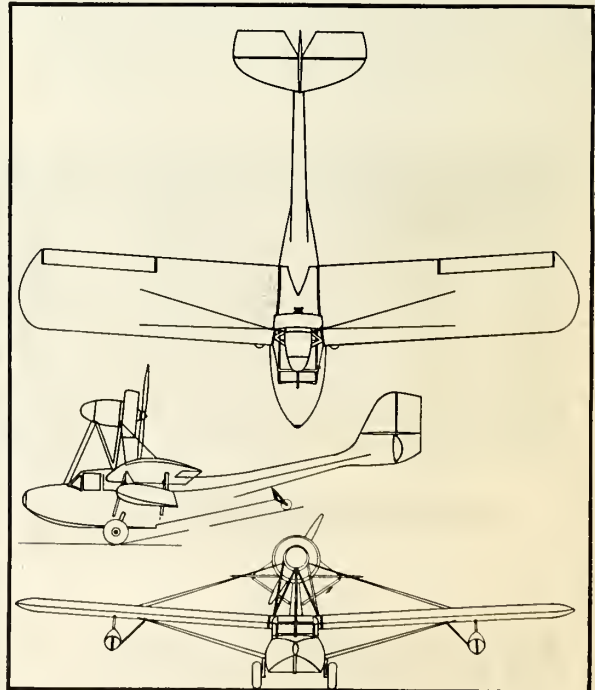
Experience in the manufacture of small sport amphibions has proven the necessity for the development of a shock-absorbing device between the bottom of the wing float and the wing structure, and the Privateer III has a device for this purpose. A new type of wing float has been incorporated which gives a cleaner appearance with less drag than the former models.

A new airfoil section is used, greatly improving the performance.

Stainless steel spot-welded construction prevails through the entire tail group, including all hinges, torque tubes, control horns, and ailerons. All wing ribs and trailing edges are spot-welded stainless steel, the only wood in the wing structure being the spars, leading edge, and wing end bow. Other parts of the hull structure are composed principally of stainless steel, as are all external trimmings, such as steps, window ledges, windshield frame, and cabin trim.



Views of the Privateer III amphibion at Roosevelt Field



Scale outline drawings of the Privateer III amphibion

The engine mount has complete insulation from the hull itself with a rubber shock absorber contained within male and female cups bolted through and through. The latest type of Townend ring with quickly detachable mount is installed.

The distinctive handling qualities of the Privateer on the water have been retained and, in fact, improved in the new model by the use of a larger steerable tail wheel rudder combination, which operates in conjunction with ample rudder

surface. Both water rudder and air rudder are operated by the foot pedal.

General dimensions of the Privateer III are as follows: span, 42 feet 5 inches; length, 30 feet; height (over Townend ring with ship at rest on the ground), 11 feet 7 inches.

Test flights are now being made to obtain accurate figures, and a speed of 108 miles per hour has been obtained so far. It is expected that this figure will be slightly improved after more minute adjustments are completed.

## DIGEST OF FOREIGN TECHNICAL ARTICLES

Elsa Gardner

### AIRPLANE BRAKES

Hydraulic Brakes for Aircraft, R. W. Brown. *Aircraft Engineering*, Vol. 3, No. 34, December, 1931, pp. 301-304, 318, 19 figs.

**T**HEORETICAL and practical qualities of various types of hydraulic brakes for aircraft are discussed by a member of the staff of Bendix-Perrot Brakes. The author explains the advantages and disadvantages of independent, rudder-bar or pedal, tail-skid or tail-wheel, and power-assisted control and describes in detail the weight, Lockheed, De Lavaud, Vickers hydraulic, Bendix aircraft, and Timken hydraulic brakes. He believes that the mechanical servo brake with hydraulic operation, and, in some instances, power assistance, will become standard practice. In cases of retractable tail wheels and landing gear, he considers that they are the logical development and that the institution of hydraulic brake operation would eliminate many difficulties apparent with rod or cable.

### WIND TUNNEL TESTING

On the Effect of the Walls of a Wind Tunnel upon the Lift Coefficient of a Model, T. Sasaki. *Tokio Imperial University—Aeronautical Research Institute Report No. 77*, Vol. 6, No. 11, December, 1931, pp. 315-340, 14 figs.

**T**HE author refers to a previous paper in which he reported an investigation of the variation of lift and drag on a model wing in a wind tunnel, and reviews the results obtained by others along this line of research since his report was completed. He considered that the case of a model placed in an unrestricted jet of air did not represent the case of wind tunnels of the Goettingen and Eiffel types, and believed that the mouths of the tunnel must have had some effect. This led to his investigation of the effect of both exit and collector walls of the wind tunnel.

The flow is treated as an infinite number of straight lines, in the case of effect of an exit wall. In the case in which the model is replaced by a point vortex, the results were the same as those obtained by Poggi. The results also show that the effects of both exit and collector walls are very small, and so both mouths may be considered absent and the model in a free jet of air when treating the lift and drag on a wing model in tunnels of the Goettingen and Eiffel types.

### METAL CORROSION

Experimental Studies on the Corrosion of Metals (Etudes expérimentales sur la corrosion des métaux). *Genie Civil*, Vol. 100, No. 2, January 9, 1932, pp. 35-38, 3 figs.

**T**HE method described makes it possible to characterize the corrodibility, or corrosive susceptibility of a metal by means of a precise index. This precision is obtained through a convenient definition found by studying first the initial surface of the metal and then the experimental conditions and especially the concentration of the corrosive medium in the course of the experiments. Difficulties encountered in the study of corrosion are discussed and the apparatus used in the experiments is described. Reference is made to the corrosion of aluminum alloys in salt water.

### BUCKLING OF CYLINDRICAL SHELLS UNDER TORSION

The Buckling of a Cylindrical Shell under Torsion, K. Sezawa and K. Kuba. *Tokio Imperial University—Aeronautical Research Institute Report No. 76*, Vol. 6, No. 10, December, 1931, pp. 251-314, 15 figs.

**T**HE object of the investigation reported was to study, mathematically and experimentally, the problem of buckling of a cylindrical shell that is clamped or supported at its two ends and is sub-

jected to a uniform shearing force. Values for critical shearing force, wave lengths of corrugations along the circumference, and the inclinations of corrugations to the axis of the cylinder were found. The special apparatus consisted of india-rubber sheeting stretched over two metal disks with a steel shaft running through the disk center, one disk being fixed and the other free to slide on the shaft.

It was shown that the critical force required for a long cylinder was two or three times that deduced from theory, while that required for a short cylinder agreed with the theory. The whole cylinder surface when buckled consisted of a number of whole, not fractional, corrugations of equal wave lengths. In the buckling of one mode of deformation, the corrugations of other modes were also developed. Sometimes, while the stability of a deformation of large amplitude was being maintained, the initial stability of a different mode of vibration disappeared and the latter mode might become permanently unstable. The shearing force took certain discrete values, according to the number of corrugations, but did not take any immediate value.

### THE EFFECTS OF TEMPERATURE ON METALS

The Effects of Temperature on Some of the Physical Properties of Metals, F. C. Lea and C. F. Parker. *Engineering*, Vol. 133, Nos. 3442 and 3443, January 1 and 8, 1932, pp. 23-26.

**T**HE effect of temperature and stress upon metals and the measurement of positive creep in relation to temperature and stress are dealt with and secondary effects where metals are subjected to high temperatures for long periods of time are also taken up. Two methods for determining creep at constant temperature are outlined with details of the special machines designed.

At temperatures above 500° Centigrade it was found that mild steels not only showed a low limiting creep stress, or a low stress for 0.0000001 inch per inch per hour creep, but also a tendency towards intercrystalline corrosion and oxidation of pearlitic areas, and consequently distinct changes in impact values at room temperature. With the special alloy steels that are now being made, and from which tubes can be drawn, the risk of scaling and intercrystalline corrosion at 500° Centigrade is reduced to a minimum but continuous creep may take place at 500° Centigrade at shear stresses of 2 tons per square inch. As creep is apparently caused by shearing stress, it would appear that the safe maximum tensile stress in superheated tubes may be twice as great as shearing stress at which creep is a specified amount.

*Paper presented before Section G of the British Association.*

(Continued on following page)

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### BRITISH CIVIL AVIATION

Report on the Progress of Civil Aviation 1930. British Air Ministry, 101 pp., 15 figs. and 7 maps on supplementary sheets.

**A**LTHOUGH this progress report of British civil aviation is dated 1930, it was not published until the latter part of 1931 and includes some statistics for that year also. Civil flying including air-transport operations, aircraft development, ground organization and navigation, administration, and statistics are covered in detail in Part I, while Part II is devoted to civil aviation in the dominions, India, and the British colonies. American, European, and Asiatic civil aviation is reviewed briefly in the third section of the report. Aeronautical exports for Great Britain and the United States, route mileage and miles flown on the world's regular air transport, 1919 to 1930, and other statistics are the subjects of tables in the appendix. Seven large maps which accompany the report indicate the time saved by non-stop air mail flights of 1,000 miles from London, main trunk air routes, 1930-31, and air routes in the British Empire, Europe and extensions, and Africa, 1930-31, and in Canada and the United States during the year 1930.

### PROPELLER TESTS

Wind Tunnel Tests on High-Tip Speed Airscrews. Further Experiments on Scale Effect. A. S. Hartshorn and G. P. Douglas. (British) Aeronautical Research Committee—Reports and Memoranda No. 1417 (Ae. 538), May, 1931, 17 pp., 9 figs.

**T**HE investigations into the effects of high tip speeds on propeller performance are continued in the reported experiments which were designed to find if the results which had been obtained for model propellers were modified when the size of the propeller was increased. A propeller having blades geometrically similar but 50 per cent larger than those of a propeller model previously tested was measured. The results indicated that with this propeller the compressibility stall was mainly dependent on the radius rather than on the size of the propeller. The effect of the 50 per cent increase in scale appeared to delay the compressibility stall about 0.02 of the speed of sound.

### ESSENTIALS FOR TRANSPORT AIRPLANES

Essential Points in Civil Aircraft. Aircraft Engineering, Vol. 4, No. 35, January, 1932, pp. 10-12, 5 figs.

**V**IEWS of the Dutch Fokker Company on the relative importance of various characteristics of airplanes are given and factors pointed out to which too little attention is paid, but which nevertheless play an important part in increasing or decreasing the serviceability of an airplane for efficient and safe aerial trans-

port. The question of whether greater speed obtained by increasing the engine power compensates for the drawbacks of the higher cost of engines, greater weight at a sacrifice of useful load, and greater fuel consumption is discussed in detail.

Means for insuring safety, reliability, and economy in running, which are factors of vital interest to an airway company, are brought out, and the question of single or multi-engined planes is concluded to depend upon the nature of the territory flown over.

### AIRSHIP MOTIONS

Experiments on a Model of the Airship R-101 with Applications to Determine the Steady Motion of the Airship. R. Jones and A. H. Bell. (British) Aeronautical Research Committee—Reports and Memoranda No. 1400 (Ae. 521), May, 1931, 31 pp., 17 figs.

**T**HE investigations described were the result of a request from the Court of Inquiry into the Disaster to the Airship R-101, for experiments to be conducted on a model of the airship with the extra bay inserted. The results have been applied to determine the conditions under which the ship would fly steadily along rectilinear paths inclined at angles ranging from 0° to -30° to the horizontal, assuming the engines to develop a constant brake horsepower consistent with a speed of 55 knots in head-on flight.

A comparison with results of experiments made before the bay was included show that the hull characteristics had undergone some change owing to the bay and also to the introduction of fifteen reefing girders. The equilibrium calculations show that the ship had ample control surfaces for keeping the axis of the ship pointing upwards at the nose even after a considerable gas leakage forward, a possible damage to the outer cover which caused an increase in drag, or a decrease in the thrust. Stabilizing surfaces appear to have been provided with sufficient area to satisfy the usual stability criterion.

### SEAPLANE LANDING IMPACT

Stresses in the Take-Off and Landing of Seaplanes (Sollecitazioni alla partenza ed all'ammarramento negli idrovolanti). R. Verduzio. L'Aerotecnica, Vol. 11, No. 10, October, 1931, pp. 1343-1405, 50 figs. Bibliography.

**S**TRESSES acting on both flat-bottom and keeled hulls in the take-off and landing of seaplanes are discussed and it is shown that the impact depends upon the landing speed, impact angle, size, shape and elasticity of the hull bottom, and the elasticity of the whole seaplane. For the flat-bottom hull a safe landing depends on the elasticity of the parts and the greater the elasticity, the more slowly the acceleration of the mass of the water increases and the less in proportion will be the impact. In a rigid seaplane with a hull having a keeled rigid bottom, the shape and size of the bottom

determine the intensity of the impact as the accelerated water mass depends on these two factors.

Impact is proportional to the square root of the seaplane mass and to a function of the length of the impact surface and shape and angle of the keel. Owing to the fact that both a keeled bottom and the seaplane itself are never rigid, elasticity is an important factor. For seaplanes geometrically and structurally similar, the impact forces are proportional to the square root of the weight and the impact coefficients vary inversely as the square roots of their weights or masses. It is concluded that the shape of the keel is of greatest importance.

### STATIC TESTS OF HELICOPTERS

The Static Testing of Helicopters (Il collaudo statico degli elicotteri). A. Fiore. Rivista Aeronautica, Vol. 8, No. 1, January, 1932, pp. 41-51, 2 figs.

**A**FTER recalling a paper presented last April at the Congress of Italian Engineers dealing with the principal problems of helicopters, the author takes up the static testing of helicopter blades. He shows the relation between the forces causing elasticity and fracture during flight, and those offered in the static elasticity and fracture tests which he proposes for the rotating blades of the helicopter. Forces acting on each blade during flight, namely, the lifting, centrifugal and inertia forces, and the engine couple are calculated.

### PROPELLER DESIGN

Calculation of the Aerodynamic Twisting Moment Acting on the Blades of a Propeller (Sul calcolo del momento torcente aerodinamico agente sulle pale della eliche). A. Eula. L'Aerotecnica, Vol. 11, No. 11, November, 1931, pp. 1406-1421, 7 figs., 6 tables.

**A**GRAPHICAL procedure is developed for the general calculation of the aerodynamic twisting moment on the blades of a propeller, and an application is given for the case of a variable-pitch propeller. The author states that the aerodynamic twisting moment, which previously has been calculated on the basis of a simplifying hypothesis, can now be determined exactly, if the actual incidences or aspect ratios of the blade sections have been found for every condition of operation in previous aerodynamic calculations of the propeller. With the lift coefficients of the sections known, the value of the moment coefficient as regards the leading edge is known which is a function of the lift only. By simple calculation it is therefore possible to obtain the value of the elementary twisting moment in connection with any point whatever in the section plane.

Paper presented before the Aeronautical Session at the Twentieth Reunion of the Societa Italiana per il Progresso delle Scienze.

**BRITISH METEOROLOGY REPORT**

Annual Report of the Director of Meteorological Office, Presented by the Meteorological Committee to the Air Council for the year ended March 31, 1931. 53 pages.

**I**N this report of the Meteorological Committee to the British Air Council, the collection and publication of climatological data for the British Isles and all parts of the world are discussed. Reference is made to ocean meteorological services, and methods of forecasting and disseminating meteorological messages over Europe are explained. The supply of meteorological information to the Royal Air Force and for civil aviation during the year under review is covered in detail, and the work carried out by the Airship Division since the accident to the R-101 and subsequent suspension of airship operation in Great Britain is also referred to. Five first-order observatories maintained by the Meteorological Office and the meteorological and geophysical observations undertaken are described as well as international cooperation.

**HEAVY-OIL ENGINE PUMPS**

The Jerk Pump Injection System for Compression-Ignition Engines, S. W. Nixon. *Automobile Engineer*, Vol. 22, No. 289, January, 1932, pp. 31-36, 17 figs.

**S**OME features desirable in this type of injection system for heavy-oil engines having a relatively wide operating range are discussed. Experimental work carried out in the fuel-injection department of M-L, Ltd., are described with testing methods adopted by the author. Three essential conditions for pressure variation in a system are pointed out. Details of the Bosch type delivery valve are covered and means of obtaining pumping efficiency referred to.

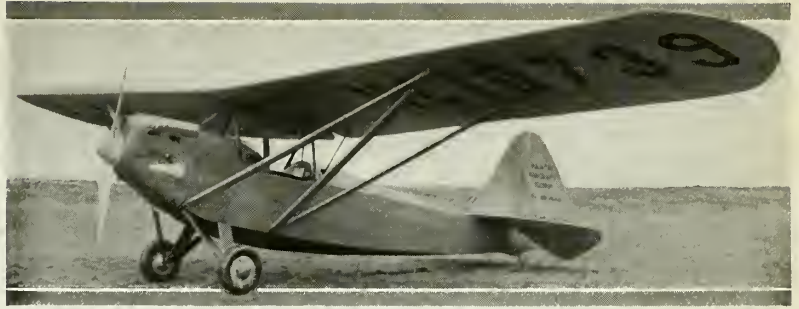
Several points in the detail design of pump and atomizer which are of considerable interest to both the manufacturer and user are brought out and the differential needle atomizer described. Future design trends are also taken up.

*Paper presented before the Institution of Automobile Engineers.*

**CLIMBING FLIGHT**

The Aeroplane in Climbing Flight, P. Dupuy. *Aircraft Engineering*, Vol. 4, No. 35, January, 1932, pp. 7-9, 4 figs.

**P**REVIOUS investigations are continued with this consideration of equations in flight rectilinear, but non-horizontal, with the airplane in climb. The regimes of flight which the author proposes for study are contained in a single vertical plane coinciding with the longitudinal plane of symmetry of the airplane. In developing the equations for flight, the author adopts the method proposed by Leroux in a recent issue of *Bulletin de l'Association Technique Maritime et L'Aeronautique*.



**HEATH LNB-4 PARASOL**

**T**HE Heath Parasol LNB-4 was announced recently by the Heath Aircraft Corporation of Niles, Michigan. Accommodating one person and ten pounds of baggage, the Parasol has been approved for home assembly by the Department of Commerce.

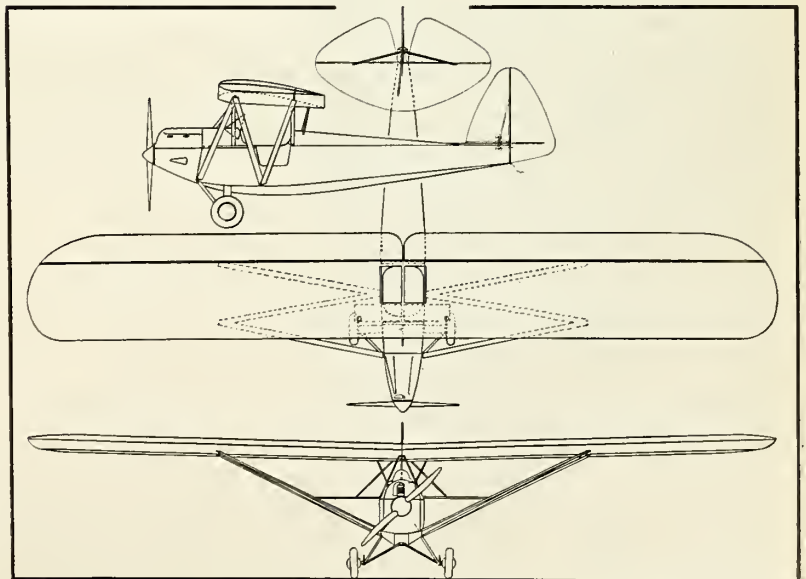
The fuselage, ailerons and tail surfaces are of welded steel tubing with fabric covering. The semi-cantilever wings are of wood construction with fabric covering. Wing braces are of steel tubing with wood fairing. Wing panels have a dihedral of two degrees and an incidence of four degrees. The absence of wires in the bracing system of the wings makes it easy to rig the ship properly.

The landing gear is of the split axle type with rubber ring shock absorbers. The wheels are Heath 16 inch by four inch cast metal with 16 inch by four inch Firestone tires. The wheel tread is four feet. The Parasol may also be fitted with pontoons or skis.

Three Heath propellers of four-foot, nine-inch diameters are available—linen-tipped spruce, hard wood, or fixed pitch metal. Other optional features are Heath engine starter, Heath wheel brakes, and fuselage door. The weight, empty, includes all optional features.

Specifications: Span, 31 feet, 3 inches. Wing chord (including ailerons), 4 feet, 6 inches. Length overall, 17 feet, 3 inches. Height, 6 feet, 2 inches. Wing area (including ailerons), 135.5 square feet. Power loading, 28 pounds per horsepower. Wing loading, 5.16 pounds per square foot. Heath B-4 engine of 25 horsepower. Weight, empty, 450 pounds. Useful load, 250 pounds. Gross weight, 700 pounds.

Performance: High speed, 73 miles per hour. Cruising speed, 62 miles per hour. Landing speed, 32 miles per hour. Rate of climb, 500 feet per minute. Service ceiling, 11,000 feet. Radius, 330 miles. Gasoline capacity, 10 gallons.



Outline drawings of the latest type single-place Heath Parasol monoplane



## WACO MODEL A SPORTSMAN

**A**N interesting new series announced by the Waco Aircraft Company in February is the two-place, side-by-side Model A Sportsman, designed to fill the needs of the private pilot.

In addition to the Kinner engine K-5, the company will offer Model A powered with the 125-horsepower Kinner B-5, the Jacobs, the 110-horsepower Warner Scarab, the new 150-horsepower Kinner R-5 and the 165-horsepower Continental engines.

The Model A is expected to have approximately the same or slightly better performance than the Waco F. Comparing the tests already completed on the 100-horsepower model, a top speed of approximately three miles better and a cruising speed from one to two miles better with the same engine r.p.m. are obtained. It is believed that these figures will follow through in the various power ranges, making allowance for variation due to the use of a seven-cylinder engine instead of a five.

Comfort is particularly emphasized in the seat cushions and backs, and in the width of the seat. Comfort was not sacrificed in order to provide particularly beautiful lines, which, while pleasing to the eye, may be extremely uncomfortable on long cross-country flights. The seat cushion and upholstery at the back are deep, soft and form-fitting.

Adequate luggage facilities are provided for the tourist. The main baggage compartment ahead of the front seat, licensed for 100 pounds, provides ample space for the transportation of two full-size Gladstone bags, two hat boxes, and two overnight bags. The rear compartment will carry two full sets of golf clubs in the largest bags offered on the market today, and this space provides more than enough room for all of the guns or fishing tackle required on a hunting and fishing trip.

While the airplane is primarily an

open ship, the winter top affords comfort equal to that of the cabin ship. The cockpit can be equipped with cabin-type heater and with the winter top installed, visibility leaves nothing to be desired. The top is readily removable; it can be taken off or put on by one man in thirty minutes, is properly ventilated, and in the event of suddenly-encountered warm weather, can be left on without discomfort.

Type tests for Type Certificate on the Kinner K-5 job were completed about the middle of February, and other power plants are being installed and flight tests with the various engines continued as rapidly as possible. It is anticipated that when the Waco Company exhibits at the Detroit Aircraft Show, Type Certificates on all six engine installations will have been received.

## CONTINENTAL 215 H.P. ENGINE

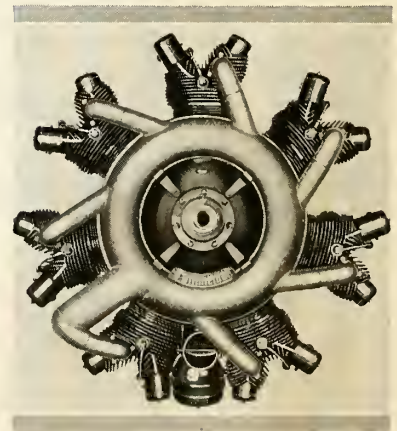
**T**HE Continental Aircraft Engine Company has announced a new engine, to be known as the Continental R-670. This engine, which has already been granted Department of Commerce Approved Type Certificate with an official rating of 215 horsepower at 2,000 r.p.m., is an enlarged version of the now widely known A-70 model. Basically, the two models are identical, the R-670 accomplishing its increased power by enlargement of the bore from 4 $\frac{1}{8}$  inches to 5 $\frac{1}{8}$  inches, increasing the piston displacement from 544 cubic inches to 668 cubic inches. The addition of 45 horsepower to the output of the A-70 engine is attained with an increase in weight of only 25 pounds, or a total dry weight of 425 pounds. This engine, therefore, with a specific weight of 1.98

pounds per horsepower, is said to be the lightest engine in its power class in the world.

Since only the bore of the A-70 engine has been enlarged, the overall and installation dimensions of the R-670 engine are identical with those of the A-70, a matter of some convenience to those aircraft manufacturers and owners who contemplate a direct replacement of the A-70 by the R-670 engine. Accompanying the change of bore, of course, there has been a complete redesign of the cylinder and head in the course of which the cooling fins on the head have been rearranged to improve cooling and reduce detonation tendencies. The bore enlargement also has made necessary a replacement of the piston, which is now a permanent mold casting in place of the semi-permanent mold construction used on the A-70 engine. Oil scraping has been improved by the use of a 3/16 instead of  $\frac{1}{8}$  inch Perfect Circle oil ring in the third groove with plain Perfect Circle compression rings in the first, second and fourth (skirt) groove. Link pins have been enlarged to reduce explosion stresses and link rod inner ends increased accordingly, but otherwise the connecting rod assembly remains unaltered.

Intake and exhaust valves have been increased in area in proportion to the displacement, but the same construction and materials are used, namely, hollow stem CNS tulip exhaust valves and solid stem tungsten intakes. Valve springs have been redesigned to change the bouncing period, but the valve actuating mechanism otherwise (cam, tappets, push rods, rocker arms and spring retainers) are unaltered, with the exception that tappets and guides have been lengthened slightly and push rods shortened correspondingly to accommodate the new "chevron packed" tappet. This tappet embodies two chevron-section packing rings seated in a gland in the tappet guide by the spring load on the

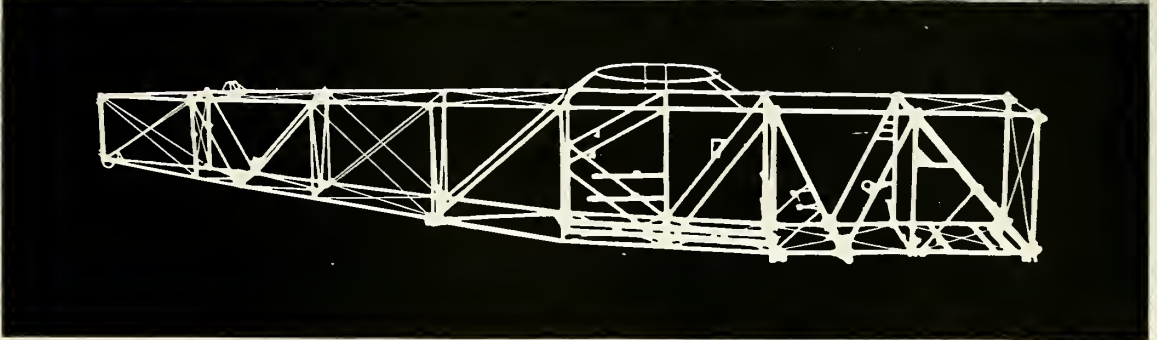
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215 h.p. Continental R-670 engine



**STRUCTURALLY  
SOUND**



**I**n the making of various types of transportation equipment, soundness of structural parts has always been a leading consideration. Wherever seamless tubing has been a part of such equipment, the service has usually been exacting. In recent years the uncompromising requirements of aircraft design have imposed still greater demands upon tubing, now generally used for the fusilage construction.

In the manufacture of NATIONAL-SHELBY Aircraft Tubing, all the accumulated knowledge and experience of the largest manufacturer of tubular products in the world are concentrated on the one object—reliability. Every foot is subjected to the most rigid inspections and tests and is both physically and chemically made to conform to United States Army and United States Navy Specifications.

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**NATIONAL-SHELBY AIRCRAFT TUBING**

(Continued from preceding page)

push rod housing. This construction has been found to be remarkably effective in prohibiting oil leakage at the tappets.

The R-670 crankcase, in addition to enlargement of the cylinder openings, differs from the A-70 in the intake manifold and the oil sump, which are incorporated in the rear crankcase section. The intake manifold cross-sectional area has been increased to correspond with the increase in displacement, and abrupt changes in section have been relieved. The oil sump has been increased in depth to accommodate a greater quantity of oil without its spilling over into the cylinders, and a drilled passage from the scavenger pump has been arranged to suck from the bottom of the sump. To clean up the front of the engine and to conform with military requirements, the breather has been moved from the front crankcase to the accessory case. Otherwise the accessory case as used on the A-70 engine remains unchanged.

Accessories are identical with those used on the A-70 engine with the exception of the carburetor and the oil filter. The Stromberg NAR6 carburetor is used on the R-670 engine in place of the NAR5, and a standard reinforced fine mesh screen is employed in the oil filter in place of the stacked disc element, which in the A-70 engine under extreme temperature conditions was not entirely satisfactory.

The development of the R-670 engine has been under way at the Continental Detroit plant for many months, and an imposing record of test stand, dynamometer and flight testing evidences the thoroughness of the work.

## IMPROVEMENTS IN THE AERONCA

TWO accessory additions are available for the 1932 Aeronca—a comfortable, easily-removable winter enclosure and an oleo-type landing gear; both are now optional as standard equipment.

The enclosure adds materially to its appearance and opens up a wider private owner market, especially in the transportation field. Although the winter enclosure may look like a permanent part of the ship, it is easily removable for summer flying. This enclosure is of the two-door type, permitting entrance or exit from either side. It is a strong metal-framed structure weighing 12 pounds complete. Fitted to the standard airplane without any change in the existing structure, it provides optional open or closed plane features. The windows are pyralin, the same as the windshield which serves to form the front of the cabin without change.

The oleo landing gear, of unique design necessitated by the absence of parallel hinge points on the landing gear, is being adopted as standard equipment in the near future. This landing gear increases the ease of taking off and landing by eliminating the porpoising tendency experienced with rigid struts and air wheels. It also will reduce maintenance cost because high "pancake" landings can be made without injury to the ship. There is a travel of 5½ inches in the shock strut plus the deflection of 2 to 3 inches allowed by the air wheel. This oleo-type landing gear requires no change in the present plane other than the removal of the fixed gear. It is, therefore, adaptable to all existing Aeroncas.

A new head has been perfected for the Aeronca E-113A engine for 1932. It has a single enclosure for both rocker arms, gives direct valve-action instead of angular and affords better cooling. No moving parts are exposed.

In addition to these major plane and engine improvements numerous small refinements have been effected which add to the appearance and durability of the plane.

The Aeronca engine is a two-cylinder opposed type with air-cooled overhead valves. Its specifications are as follows:

### Aeronca E-113A Engine

Horsepower (manufacturer's rating)  
40 at 2,520 r.p.m.

Horsepower (Dept. of Comm. rating)  
36 at 2,400 r.p.m.  
Bore .....4.25 inches  
Stroke .....4 inches  
Piston displacement ..113.5 cubic inches  
Compression ratio .....5 to 1  
Gas consumption (cruising speed)  
2.5 to 3 gals. an hour  
Overall diameter.....28 inches  
Length .....24 inches  
Weight (complete with hub) .113 pounds

At the Detroit Aircraft Show the Aeronautical Corporation of America will have on display an Aeronca *Collegian* with a winter enclosure, oleo landing gear and new type engine cylinder head, an open model on floats and an enclosed *Collegian* on the field for demonstration purposes.

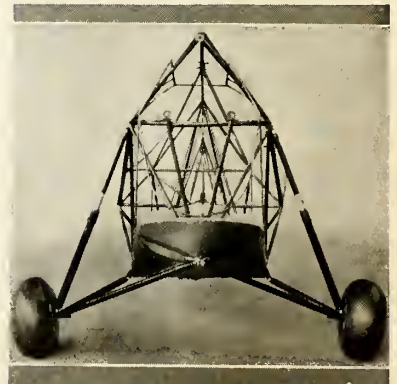
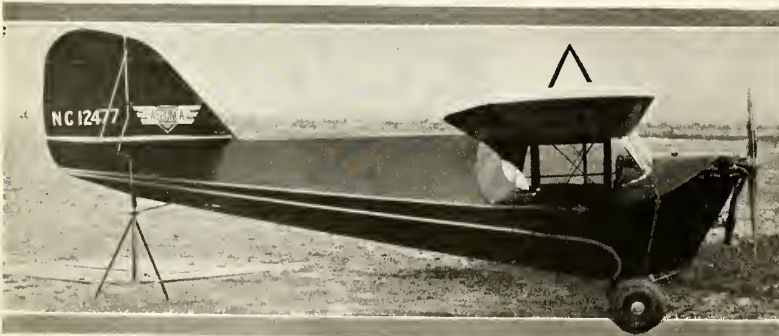
## 160 H. P. TYPE R-5 KINNER ENGINE

THE Kinner Airplane & Motor Corp., Ltd., announces a new addition to its line of airplane engines, a five-cylinder radial air-cooled engine known as Type R-5.

It develops 160 horsepower at 1,975 revolutions per minute, with a compression ratio of five to one and a total piston displacement of 490 cubic inches, and has an actual brake mean effective pressure of 134 pounds per square inch. It weighs 1.91 pounds per horsepower, or a total of 305 pounds, which is 75 pounds less than the closest competitive engine developing this horsepower.

Three of the largest manufacturers of commercial airplanes in this country are planning to use this engine in their 1932 production.

Kinner now has Approved Type Certificates for the following four types of engine: K-5 (100 horsepower), weight, 280 pounds; B-5 (125 horsepower), weight, 295 pounds; C-5, (210 horsepower), weight, 420 pounds; R-5 (160 horsepower), weight, 305 pounds.



Aeronca with winter enclosure, and (right) new oleo landing gear

# BELLANCA

*will be at Detroit*

**WITH NEW ANNOUNCEMENTS**

**ABOUT BELLANCA PLANES**

**B**ELLANCA leadership once more will be asserted at the National Aircraft Show in Detroit. Sales gains and popularity will not be the only basis of this claim. Bellanca performance records will again confirm the superiority of Bellanca planes. The new announcements to be made at Detroit by this company will also provide renewed evidence that Bellanca design keeps always to the forefront, always a step in advance of the needs of air transportation.

If you are considering the purchase of new equipment and comparing values now on the market, it will pay you to wait until you see the 1932 Bellanca exhibit at Detroit, unless you prefer to view these models under construction at the Bellanca factory, New Castle, Delaware, before March 28th, making the trip as the company's guest in one of its demonstration planes.

**BELLANCA AIRCRAFT CORPORATION**  
 New Castle, Delaware      Chrysler Building, New York  
 Bellanca Aircraft of Canada, Ltd., Montreal

# BELLANCA

**BUILT AS ONLY BELLANCA CAN BUILD**

# NEW EQUIPMENT AND METHODS

## CORROSION-RESISTANT ALLOYS

SEVERAL new alloys of special interest to the aeronautic industry recently have been announced. A new aluminum alloy, called chromal, has been produced by J. Harden of the Stockholm Metallographic Institute, and may prove important in airplane construction because of its strength, lightness, and resistance to corrosion. Vicrometal and batterium metal, which recently were developed, are anti-corrosive materials that have found applications in valves of engines.

Chromal contains chromium, nickel and manganese as well as aluminum. It is said to have been perfected by means of a special patented process which solves the problem of uniting aluminum with chromium.

Batterium consists primarily of copper and aluminum, together with nickel and small percentages of other metals. The material is said to have been developed for use in plate terminals of certain car batteries, but it has found other applications. The National Physical Laboratory of Great Britain has reported on the physical and electrical properties of this alloy.

A specially treated nickel-chromium alloy called vicrometal has been developed for use in valve seats. This alloy is said to be highly resistant to corrosion and to retain its polished surface under extreme temperatures, even after years of service. The disks are of nickel-copper alloy, and other internal parts also are made from non-corroding alloys.

## HILLS-McCANNA TENSIO METER

THE Hills-McCanna Tensiometer has been designed recently to give the tension on wires, cables and lines quickly and accurately. Airplane manufacturers and airports may find it useful for determining the pull on an airplane propeller at different speeds and for giving each wing wire and strut an even tension.

The heavy aluminum case and all exposed parts of the Tensiometer are chromium plated or made of stainless steel. Its weight is 14 pounds and the overall length is two and one-half feet,

which enables easy handling and use in many positions and places. The standard model is made to test all wires and ropes up to one inch in diameter and has a tension capacity of 16,000 pounds. Larger capacity meters and meters for specially shaped streamline airplane wires can be supplied. The instrument is unusually sensitive and is said to register the slightest change of tension while in place. This accuracy also permits its use for weighing.

For operation, the Tensiometer is hooked onto the wire in any position and the center bearing tightened, which deflects the cable. The reading is given at once, the entire operation taking less than a minute. The reading is made directly from the scale in pounds, and there is no need for calculations or temperature corrections.

## AIRPLANE ENGINE MUFFLER

A MUFFLER for airplane engines which is reported to reduce noise approximately 70% and at the same time cut down back-pressure by one-third has been developed by, and is now in use on the airliners of the Eastern Air Transport System.

The device was designed and developed under the supervision of Ralph G. Lockwood, chief engineer of the company. There is one muffler for each engine, and the exhaust gases from both manifolds are run through it. The muffler's interior is in the form of a stationary screw which spins the gases, causing them to travel an additional 48 feet before being released into the open air, and providing two and one-half times the former cooling area. The result is a 70% decrease in noise volume and at the same time a reduction in back-pressure.

## DELCO VIBRATOR AND COIL

AN improved combination coil and vibrator has been placed on the market recently by the Delco Aviation Corporation, a division of the Bendix Aviation Corporation. This type of vibrator supplies a continuous spark to the booster terminal on the battery distributor or

magneto for starting. The vibrator will be known as the AV-1101 type and is designed to operate in connection with a 12-volt battery. The unit consists of an ignition coil, a pair of contacts for interrupting the primary current, and a condenser connected across the contact points, all contained in a metal housing to form a shield against radio interference. The weight of the entire unit is 13 ounces.

## SPRAY-PAINTING UNIT

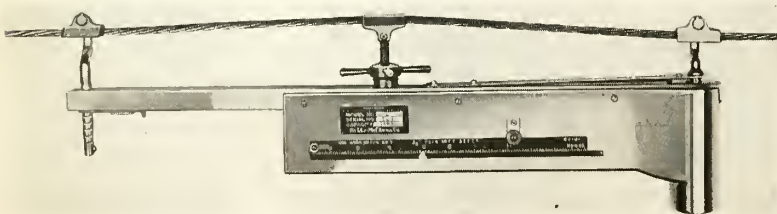
AN improved, small, portable spray-painting outfit, designed to be easily operated and carried by one person, has been introduced by The DeVilbiss Co., Toledo, Ohio, manufacturers of spray-painting and spray-finishing equipment. This outfit, known as the DeVilbiss NC607, is recommended for use as supplemental equipment for touch-up work on small sized painting or refinishing jobs. It is electrically driven and operates economically from any light socket. The compressor and motor are compactly and securely mounted on a rubber-footed metal base.

## RIB TEST JIG

THE Fairchild factory at Hagerstown, Md., has designed and constructed a rib test jig for the purpose of testing all new ribs in accordance with the Department of Commerce requirements. This jig has been so designed as to take any rib up to 9 feet in length, and permits the computation of a weight and load factor variation to any desired amount.

## MINERAL-COATED ELECTRODES

A NEW line of arc-welding electrodes, which have a heavy all-mineral flux coating, has been placed on the market by the Metal & Thermit Corporation, sales agents for the American Murex Corporation, the manufacturers. Both offices are located at 120 Broadway, New York, N. Y. The new electrodes, known as Murex, are 18 inches long and are made in types and sizes suitable for a wide range of horizontal, vertical, and overhead welding operations. A patented spiral winding of asbestos yarn serves to hold the heavy mineral flux to the core, so that it is not injured, if the electrode is bent. The all-mineral ingredients of the flux on a Murex electrode is said to cause it to burn without objectionable fumes or smoke, while the thickness of the coating enables the operator to ride the electrode on the work, thus letting the flux coating space the arc. The eight types of electrodes in the Murex line include those for welding commercial mild steel, manganese steel, 18-8 stainless, and stainless iron.



The Hills-McCanna Tensiometer for indicating tension of cables

**ELECTRIC HEATING UNIT**

HEATING of aviators' gloves and clothing by electricity from the airplane storage battery is among the possibilities of a new, flexible, rubber heating unit announced by the General Electric Co. This unit consists of a thin rubber strip, about a half inch wide and a foot long, very flexible, and having a heating element vulcanized inside. It is designed to work on the 12 to 14 volts of the airplane storage battery, draws about a third of an ampere in current and thus is rated about three and one-half watts.

Some experiments have already been carried out by Wright Field on gloves incorporating the new element. The War Department has purchased about 200 of the units. The glove is of the thumb and one finger design and is made of light, fine material with a cuff of lamb's wool. Four heating elements are sewed between the lining and the outer cover of the glove—one over the finger, one over the thumb, and two over the mitten part of the glove. Wires run from the gloves to the battery in the cockpit, and a switch on the panel turns the heat on or off.

**CHROME PISTON PINS**

A CHROME-PLATED piston pin which will outwear a hardened steel pin and is corrosion-resistant has been developed and offered for both equipment and replacement use by Thompson Products, Inc. The virtue of chrome plating lies in its extreme hardness and resistance to wear. One of the most recent applications of chrome plating is to high-power rifle barrels. The chrome-plated pin is said to have a lower coefficient of friction than the hardened steel pin, and the danger of seizure between pin and piston boss is minimized. The pin never requires replacement during the life of the engine. Scrapping of pins in storage because of rust or fingerprints is eliminated. The chrome-plated pin can be distinguished by its bluish-gray color.

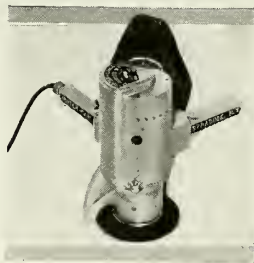
**DISC SANDER-GRINDER**

THE Porter-Cable-Hutchinson Corporation, Syracuse, N. Y., recently announced the Dustless Disc Sander-Grinder, Type E-7. This device is designed to eliminate the health hazard of dust and, according to the manufacturers, is the only portable disc sander-grinder having an inbuilt vacuum system for picking up the dust.

The seven-inch abrasive disc travels at the rate of 3,200 r. p. m. while cutting. Discs are retained by a thin head screw which is tightened into a recess below the surface of the abrasive by a socket wrench furnished with the machine. This facilitates changing of discs. A rubber pad gives a flexible backing to the disc.

The machine is operated by grasping

the two handles and tilting it forward about five degrees onto the disc. A double pole toggle switch is mounted on one handle, allowing the turning on or off of power by a flick of the right thumb. Power is furnished by a General Electric Universal motor developing one horsepower. The motor is protected from dust, since the dust is drawn up through



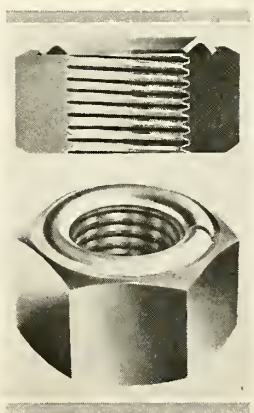
Porter Dustless Sander

an enclosed passage completely sealed from the motor.

With a height over all of 12 inches, the sander-grinder weighs 21 pounds. It has a no load speed of 3,700 r. p. m. and is equipped with all precision ball bearings and precision hobbled gears, reduction three to one. Equipment also includes 12 assorted sanding discs for wood and 15 feet of rubber-covered conductor cable with unbreakable duplex plug. An assortment of sanding discs for metal is available.

**CONVENIENT LOCK NUT**

THE "Velock" nut, incorporating a V-shaped locking ring to eliminate movements causing the loosening of the nut, is being manufactured by Patent A. B. Velock, Stockholm, Sweden. The locking ring follows the movements of the seating part, acting as a powerful buffer and consequently holding the nut tight against the threads of the bolt. All move-



The "Velock" nut

ments along the axis of the bolt are eliminated by the locking ring and do not affect the nut.

When the nut is tightened, the locking ring is pressed in against the bolt threads. Its inside diameter is reduced, and the ring, and consequently the nut, is locked on the bolt. As a result, the twisting movement of the nut is stopped.

The locking ring acts as an angle lever, and the locking power is exerted automatically on all the threads of the nut, without damage to them. The ring is made of non-ferrous metal, eliminating its being affected by temperature variations or moisture. It is attached to the nut but may also be placed underneath the head of an ordinary bolt, producing the same locking effect.

**LATHE FOR THE SMALL SHOP**

THE South Bend Lathe Works, South Bend, Ind., is placing on the market a new eight-inch Junior back-g geared screw-cutting lathe for general purpose use in the small shop and laboratory. Available in countershaft and individual motor drive, the lathe is built with a back-g geared headstock, with a three-step cone, providing six changes of spindle speeds—three direct for light machining at high speeds and three back-g geared for heavier work and slow speeds.

Among the mechanical features are: Hollow spindle of alloy steel, Acme precision leadscrew of 3/4-inch diameter, auto-stock set-over for taper turning, screw thread chart by which threads may be cut from four to 40 per inch. Bed lengths supplied are 24 inches, 30 inches, 36 inches and 42 inches.

All types of turning, facing, boring, chucking, drilling, tapping, tapering, reaming, grinding and polishing may be done with this lathe, and attachments are available for special work, if desired. Motor-driven lathes are equipped with 1,800 r. p. m. motor, belts, etc., and are ready to run as soon as connected with an electric lamp socket.

**LANDING LIGHT FOR AIRPLANES**

A NEW stationary airplane landing light called the Aerolite has been designed by S. W. Hyatt, formerly of the Indiana Lamp Corporation and designer of the Ryan retractable landing light. The light is designed to throw a beam straight ahead and down at the same time without being tilted or projected from the wing.

The Aerolite is equipped with a 12-volt 35-ampere 420-watt bulb and produces approximately 350,000 candle power. It is said to be specially designed, so as to offer no additional drag, and can be easily installed on new and used planes. The Aero Light Company of Connersville, Indiana, has been formed to manufacture the light.

# GERMAN TRANSPORT AIRPLANES

(Part VI)

## ROHRBACH

Edwin P. A. Heinze

WHENEVER one hears of German flying boats, two names come to mind, Dornier and Rohrbach, for these are the two internationally well-known makers of this type of aircraft. Apart from Heinkel, who has re-entered this field of production by the introduction of the new amphibian plane recently described in these pages, the two firms mentioned are the only ones engaging in the construction of flying boats in Germany.

Dr. Adolf Rohrbach, who founded the German and Danish Rohrbach Metal Aeroplane Companies in 1922, was formerly one of the leading technical men in the Zeppelin combine, to which Dornier still belongs. While with the Zeppelin company at its branch in Berlin Staaken, Dr. Rohrbach was responsible for the construction of what was at that time a giant all-metal landplane built in accordance with his own ideas. This was in 1920, and the machine was called *Staaken* after the Berlin suburb in which the manufacturing plant was located. The plane had a span of 102 feet and had four engines built into the leading edge of the wing, developing a total of 1,000 horsepower. This ship could carry 20 passengers a distance of 840 miles at a speed of 131 miles per hour. It doubtless was the most progressive plane of its time, but the Inter-Allied Aeronautical Commission ordered it to be demolished. When Dr. Rohrbach founded his own company two years later, he decided to concentrate especially on the design of multi-motored flying boats. As the manufacture of big planes was prohibited in Germany by the Allies, Rohrbach maintained at Berlin only a designing office, while the ships were executed in the Danish works. This arrangement worked very well, and Dr. Rohrbach was highly successful in his venture.

All Rohrbach flying boats are distinguished by having a ship-like hull with two or three gliding steps; the two wing sections are attached to the hull at a pronounced dihedral angle. The monoplane wings are of cantilever type. Yet in some models additional support is given by struts or cables connecting the wing spars with the hull. Also characteristic

of Rohrbach flying boats are the floats under each wing, and the engine nacelles set on struts above the wings. The ships have retained these features all through their development. But the blunt bows and relatively flat bottoms of the first ships were discarded in 1924, when the first ship with sharp prow was launched, to be followed two years later by the first ship with sharp prow and sharp keel forward. Thus Rohrbach recognized the importance of achieving a good wave-parting hull bow and keel and succeeded in introducing these new forms without sacrificing buoyancy. The hull shape was developed in thousands of tank tests carried through in the hydrodynamical research institutes at Hamburg and Berlin. The introduction of these improvements considerably increased the seaworthiness of the ships and enabled them to start and land in a relatively high sea without inconvenience to passengers.

During the first four years of the company's existence, work was devoted exclusively to the construction of military aircraft, which were sold mostly, along with manufacturing licenses, to Japan, Great Britain, and Turkey. Among the first ships were also several landplanes, such as the famous *Inflexible*, built after Rohrbach plans in Great Britain by William Beardmore & Co. of Glasgow.

In the first planes, tractor screws were generally employed, while in the later planes preference was given to pusher screws. During the first four years Rohrbach machines generally had wings with parallel leading and trailing edges, that is, uniform chord. But when in 1926 the construction of large transport planes was permitted by the Allies and the matter of a high payload became of prime importance, means had to be found to reduce the weight of the wing structure, and the tapering wing type came into

being. In contour the new Rohrbach wings are not dissimilar to the Junkers wings, but in their construction they are quite different. The strength of this type of wing permits that high wing loads be adopted without impairing safety and, in fact, wing loads as high as 26 pounds per square foot have been employed by Rohrbach with success.

The first plane to be built in Germany by Rohrbach was the *Robbe I*, which was meant for passenger transport. The experience gained with the first ship encouraged further development in this direction, as the machine showed excellent flying qualities and won four international records with loads from 1,100 pounds to 2,200 pounds.

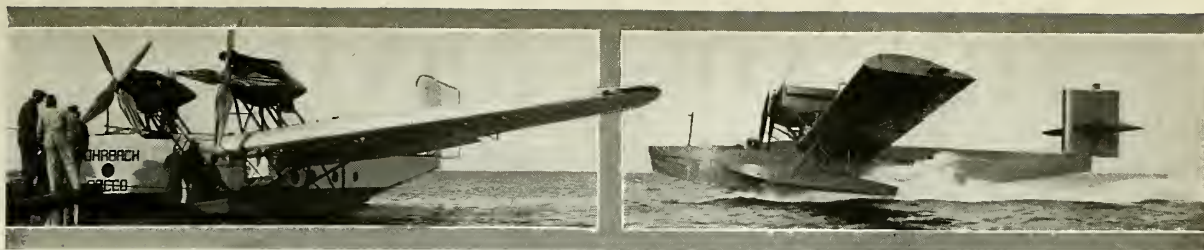
When permission to build large transport planes in Germany was granted, the German Rohrbach company erected its own factory in Berlin, and henceforth this became the center of activities. Nevertheless, a new fighting plane, the *Rofix*, was designed and built at Copenhagen. This was the only single-engined ship designed by Rohrbach, who thereafter decided to build only multi-motored machines.

With the exception of heavily stressed fittings (such as wing connections to the hull, which consist of forged steel) heat-treated duralumin, provided with an anti-corrosive coat both before and after assembly, is used throughout in sheets and in the form of simple, pressed, open profiles. Good accessibility of all rivets is achieved throughout. Also the machines can easily be taken apart for transport.

The wings consist of a single large box spar with a girder work frame and duralumin plate skin. This spar is exceedingly rigid and, in the large machines, is in itself water-tight so it will float on the water. It is secured in the usual manner to a middle section integral with the hull roof structure, and the full wing is completed by hanging on and securing to the spar the leading and trailing edge parts, which consist of a number of shaped boxes, some of which are fuel tanks, or of formed frames. The wings and ailerons are covered with this duralumin. Ailerons are built up of several parts bolted together and so attached as



The Rohrbach "Staaken," a 1,000 h.p. multi-engined all-metal 20-passenger monoplane built in 1920



Rohrbach *Rocco* of 1927 and (right) the *Ro.II* of 1925 with two Rolls Royce engines

to leave a slot between them and the wing. The rudder and elevators are balanced to facilitate steering.

The hull is constructed along the lines followed in ship building, with transverse frames and bulkheads connected by longerons.

Attached on each side of the fin by means of two steel fittings each are the halves of the stabilizer. The stabilizer surfaces are braced against the hull by a strut on each side. The two halves of the elevator have a common shaft, which passes through the fin. The normal type of dual controls is provided. Steering transmission consists entirely of rods and levers, in which system all joints are fitted with lubricators. Levers and shafts are supported in ball or plain bearings. Ball bearings are also employed for the pivots of the control surfaces. In order to avoid impairing the working of magnetic compasses, all control members in the cockpit are of non-magnetic material. Adjustable, highly-elastic rubber cords serve to balance the rudders in the event of an engine's failure during flight.

Rohrbach flying boats have two or three engines arranged, together with the radiators (generally water-cooled engines are employed), in a frame with cowling supported by two couples of stays, of which each couple meets in a point at the wing fitting. These stay couples are connected by diagonal struts, and as the engine is supported thus only on two points on a line parallel with the longitudinal axis of the ship, they have to be supported laterally, which is done by means of two relatively thin inter-braced struts extending down on one side to the wing or hull deck.

All engine control rods are arranged inside a single streamlined pipe leading down into the wing. No fuel pipes pass inside the passenger quarters of the hull, so a maximum of safety from fire is provided.

The Rohrbach range of civilian transport planes comprises four types of flying boats and one type of landplane. Of the flying boats, so far, large numbers have not been built and those in operation are mainly employed for mail and express transport. The German air service requires but few flying boats at present in the Baltic Sea for communication with Scandinavia and Denmark. The Rohrbach landplane, *Roland*, however, has been built in large numbers, and numerous of these machines have been in constant service for many years.

### *Robbe*

The first type of civilian transport plane developed by Rohrbach was the *Robbe I*, which has a length of 43.3 feet, a wing span of 51.5 feet, a wing area of 430.5 feet, and a height of 16 feet. These machines, first produced in 1926, had a sharp keel in addition to the sharp prow developed in 1924. Bow and keel make this type of ship exceptionally serviceable.

The *Robbe I* has two six-cylinder water-cooled B.M.W. IV engines of 250 to 340 horsepower output each, provided with pusher screws, and weighs, fully equipped, 4,380 pounds. Its carrying capacity, including crew and fuel, is 3,760 pounds. Fully laden, it weighs 8,140 pounds. Its maximum speed is 133 miles per hour, and its cruising speed, 118 miles per hour. This type of ship is employed mostly for mail transport.

Owing to the use of pusher screws, the radiators in front of the engines do not receive sufficient wind, when the ship is cruising on the water, so special seawater radiators are provided. An auxiliary motor drives a pump to suck up water from the sea to flow through a tank with pipe coils through which the engine water passes. The quantity of sea water passing through the tank is adjustable, so the degree of cooling is within the control of the crew. Radiator shutters are provided on the normal radiators. Readily accessible drain cocks enable the whole cooling water system of each motor to be quickly drained.

The satisfactory performances of the *Robbe I* ships led to the design of the considerably larger *Robbe II*, which appeared in 1927 and was the direct precursors of the *Romar*, which, before the *Do-X* appeared, was the largest flying boat. The *Robbe II* was expressly constructed to test the new type of wing in large dimensions and to find out whether it in any way prejudices the good flying qualities and maneuverability of the ship in the air. The ship was later taken apart (for in the meantime a larger new type of ship more suited for passenger transport work had been developed), but the experience gained with her was so satisfactory that no difficulties stood in the way of using a wing of the same kind of even greater span in a later boat.

The *Robbe II* had a span of 70½ feet and a supporting area of 592-square feet. The hull was 49.8 feet long, and the overall height of the machine was 19.3 feet. Fully laden, the ship weighed 15,400

pounds, and she was equipped with two 12-cylinder water-cooled B.M.W. VI engines of 500 to 750 horsepower output each, which gave a maximum speed of 137 miles per hour and a normal cruising speed of 121 miles per hour, for the difference between safe constant and permissible maximum output of the B.M.W. VI engines is considerable. Only one ship of this class was built.

### *Rocco*

The *Rocco* of 1927 was the first ship built solely for passenger transport, having a cabin with ten seats and room for a crew of three. The *Rocco* performed in every way better than was guaranteed and demanded. With a wind of 36 feet per second, the ship was able to take off from the water in every direction, irrespective of the wind direction.

The hull of this ship has two shallow steps, and from the sharp bow to the first step the bottom sides of the keel are concave, so the waves cause the ship to ride on top of them without much spray. The hull is divided into several water-tight compartments by bulkheads with water-tight doors having central locks. The bulkheads are so spaced that two adjacent compartments may fill with water without causing the ship to capsize, and as many as four to five compartments may fill with water without causing the ship to sink. In the collision compartment only stowage is carried. Behind this is the pilots' cabin with two seats and to the rear of this, the wireless room. Then follows the cabin with the hatchway in the rear, to one side of which is the lavatory.

The lateral floats, which leave the water when the ship rises on her steps, are supported in a manner similar to the engines. The wings have two struts on each side connecting them with the hull, and the float struts are braced against these.

The *Rocco* has two Rolls Royce *Condor III* engines of 600 to 670 horsepower output each, which give her a maximum speed of 125 miles per hour and a normal travelling speed of 116 miles per hour. Empty, but including complete equipment, the ship weighs 15,860 pounds and is able to carry a load of 7,280 pounds, so her gross flying weight amounts to 23,100 pounds. The span of the wing is 85 feet and the area, 1,011.8 square feet. The hull has a length of 63.3 feet and an overall height of 21.9 feet.

# THE AIR SERVICES

## *War Aces in the Air Corps*

SERVING with the Air Corps are eight officers who, by virtue of having achieved five or more victories in aerial combat during the World War, carry the unofficial designation of "Ace." The leading "Ace" now in active service is Lieut. John S. Griffith, a member of the First Pursuit Group at Selfridge Field, Mt. Clemens, Mich., who is credited with nine victories. Due to the fact that Lieut. Griffith's service during the war was with the British Royal Air Force, he was not listed among the American "Aces."

Captain Frank O'D. Hunter is credited with eight victories; Captain Arthur E. Easterbrook and Lieut. Martinus Stenseth, with six each; Captains Clayton L. Bissell, Harold H. George, James A. Healy and Victor H. Strahm, with five each.

Officers still in the service who are credited with four victories are Captain Russell L. Maughan and Lieut. Leo H. Dawson. Major Carl Spatz, Captains Christopher W. Ford and Thomas M. Jervey are credited with three victories each. The last named officer is a member of the Ordnance Department but is on duty with the Air Corps as ordnance officer at Kelly Field, Texas.

Officers credited with two victories each are Majors John F. Curry, John N. Reynolds, Captains Benjamin F. Giles, George C. Kenney, Edward M. Morris, Victor Parks, Jr., and Lieut. Reuben D. Biggs. Captain Parks holds a commission in the Chemical Warfare Service. Only four officers now serving with the Air Corps are credited with one victory each: Majors Maxwell Kirby, Asa N. Duncan, Captains Edward C. Black and George L. Usher.

## *Colonel Longanecker Transferred*

LIEUT.-COL. Ira Longanecker, for the last four years Chief of the Information Division of the Office of the Chief of the Air Corps in Washington, was transferred to Fort Sam Houston, Texas, to assume the duties of Air Officer of the Eighth Corps Area. As Chief of the Information Division, Colonel Longanecker supervised the photographic, press relations and foreign liaison activities of the Air Corps, and in 1931 headed the Intelligence Section of the Staff of the First Air Division during its extensive air maneuvers throughout the Northeast.

## *Award Sunnyvale Contracts*

THE Bureau of Yards and Docks, Navy Department, has awarded a con-

tract to the Stacey Manufacturing Co., Cincinnati, Ohio, for the 2,000,000-cubic-foot helium holder at the Naval Air Station, Sunnyvale, California, for \$114,487. The holder will be approximately 145 feet in diameter and 170 feet high and will be of the quadruple lift wet type similar to the large gas holders in every large city. This holder will be used to receive the impure helium which must be removed intermittently from the airship *Akron* and its sister ship, ZRS-5, for repurification. It is expected that the holder will be completed about September 1st.

A contract was also awarded to the Pittsburgh-Des Moines Steel Company of Pittsburgh, Pa., for a 200,000-gallon elevated water tank at Sunnyvale, Calif., for \$10,360.

## *Delivery Begun on Army YP-16's*

THE first of twenty-five pursuit planes of advanced type being built for the Army by the B/J Aircraft Corporation of Baltimore, Md., has been delivered, and according to Temple N. Joyce, vice president and general manager of the B/J corporation, the remaining planes would be delivered at the rate of six a month until the production order is completed. The planes are being constructed at a cost of \$450,000.

The new planes are said to represent an innovation in military construction, being two-seaters, but retaining the high performance characteristics of a single-seater fighter. These planes are to be known as the YP-16's. In addition to the fighter pilot, the planes carry a gunner in a rear cockpit.

## *1931 Cheney Award Winners*

LIEUT. ROBERT D. MOOR and Private John B. Smith were chosen to receive the Cheney Award for 1931. The award is made yearly to the officer or enlisted man of the Army Air Corps or Air Corps Reserve performing the outstanding act of valor or extreme fortitude or self-sacrifice in a humanitarian interest in connection with flying. It was made posthumously to Lieutenant Moor, who was serving as an Army instructor in the Michigan National Guard Air Unit. Private Smith is a member of the 16th Observation Squadron at Fort Benning, Ga.

## *Military Aeronautical Sales Rise*

A 1931 INCREASE of 13.4 per cent in the sale of military aeronautical products over 1930 was reported, according to Department of Commerce figures. Totals of \$32,436,635 for 1931 and \$28,589,348 for 1930 were reported.

## *The Akron Is Defended*

THE RECENT investigation by the House Naval Committee concerning charges made against the construction of the *Akron* brought forward many defenders of the airship. Among them were Dr. Karl Arnstein, designer of the ship; Lieutenant-Commander Charles E. Rosendahl, its commanding officer; Dr. Hugo Eckener, commander of the Graf Zeppelin; and Paul W. Litchfield, president of the Goodyear-Zeppelin Company.

In a statement made during the investigation before the House Naval Committee, Commander Garland Fulton, U.S.N., said, "There has appeared in the public press and from other sources criticism of one sort or another directed against the *USS Akron*, particularly on the grounds of overweight and lack of speed. In my opinion none of this criticism is justified when examined in the light of facts and with appreciation of what qualities an airship should have. I know of several cases of persons, unfamiliar with airships, who were at first prone to criticize, but after visiting the *Akron* in her final stages of construction came away filled with amazement and praise for a remarkable engineering achievement."

## *Boeing Busy on Service Contracts*

AT THE END of February the Boeing Airplane Company had completed delivery of ninety-eight pursuit planes on its contract with the Air Corps for P-12E aircraft, and it is expected the entire order will be finished in April. The largest single delivery of planes on the contract took place February 1, when fifteen P-12E's, flown by flight officers of the First Pursuit Group, Selfridge Field, under the leadership of Capt. R. C. W. Blessley, took off from Seattle to ferry the planes East to the Mt. Clemens, Mich., air base. Departure of seven more P-12E's for Selfridge Field, flown by First Pursuit Group officers led by Major George H. Brett, commanding officer of Selfridge Field, completed delivery of pursuits to this Air Corps base on the current Boeing contract. Remaining pursuits will be flown South to Mather and March Fields in California.

During the latter part of this month the first of fifty-four F4B-4's will be completed by the Boeing Airplane Company. These planes are being built on a seventy-five plane order for the Navy, the first twenty-one fighters having already been delivered as F4B-3's. Minor changes to modify the model alter the designation of this Wasp-powered carrier fighter.



### *Akron Used as Airplane Hangar*

THE installation of a retractable trapeze has converted part of the hull of the *Akron* into an interior hangar for four or five small fighting planes. These small airplanes, with a wing spread of less than twenty-six feet, are fitted with hooks on the upper wings with which to catch the trapeze beneath the hull when returning to the airship. They are equipped also with an arresting hook for landing aboard surface carriers.

Another device that is to be tested by the *Akron*, according to Capt. Harry E. Shoemaker, commandant of the Naval Air Station at Lakehurst, N. J., is a duraluminum "observation basket." Resembling a small airplane, the device may be lowered 2,000 feet or more, operating as a combination plane and glider. Communication between the observer-pilot in the machine and the *Akron* is by telephone. With this device it would be possible for the airship to remain above the clouds, using the basket for observation. The same idea was used by Germany during the World War, but the results were never completely disclosed.

### *"Electric Ear" on the Los Angeles*

A SONIC altimeter or electric ear capable of determining altitude from echoed sounds was tested in a flight of the *Los Angeles* over New York City February 9. The "ear," which is said to be just as sensitive as its counterpart, the electrical eye, instantly and accurately informs an airship pilot of his distance above the ground and identifies features and objects below him by emitting continual toots. The echoes, returned by objects under the ship, are heard through a stethoscope, while an indicating timer at the same time gives a reading by scale. Observers aboard the *Los Angeles* were able to distinguish the echoed sounds peculiar to skyscrapers and different localities in New York, even small hillocks giving a varied echo from the general ground level. The sonic altimeter is efficient at altitudes as high as 3,000 feet. It is hoped that the new device will prove an aid particularly in blind flying.

### *Urge Reduction of Naval Enlisted Fliers*

THE Naval Committee of the House of Representatives voted recently to approve the Vinson Bill, which would change the ratio of commissioned officers and enlisted pilots in the Navy from 70-30 to 80-20 per cent. The bill was approved at the request of Rear Admiral William A. Moffett, Chief of the Bureau of Naval Aeronautics, who pointed out that it was often difficult to find enlisted men who became satisfactory pilots, and that only 42 per cent of them made good as compared with 65 per cent of the officers. Admiral Moffett told the committee that it costs \$1,000 more to train

an enlisted man to become a flier than to train a graduate of the Naval Academy. Moreover, he said, the use of enlisted men as aviators is more expensive to the Government, because, if assigned to other work, they continue to receive the pay of high rating non-commissioned officers.

### *World War Fliers Form Club*

AN association called "World War Birds" has been organized, to include the pilots, observers, gunners and bombers of all the air forces of the nations who participated in the World War. Lieut.-Col. W. G. Schaufler, Jr., is president, and Lieut. Anton Skislewicz, secretary of the association, which has its headquarters in the Aviation Department, Court House Building, Miami, Florida.

### *Lieut.-Col. Yount to Take Command*

LIEUT.-COL. BARTON K. YOUNT, Army Air Corps, commander at Rockwell Field, California, will become commander at Bolling Field about September 1, according to a War Department announcement. Colonel Yount will replace Maj. Howard C. Davidson, who has been in charge at Bolling Field for three years.

Colonel Yount is a graduate of the Air Service Engineer School and the Air Corps Tactical School. Although commissioned in the infantry upon his graduation from West Point, Colonel Yount is rated as an air pilot and air observer. He was chief of the Air Corps in 1919 and from 1921 to 1924; from 1925 to 1929 he was assistant attaché for aviation at the United States embassy in Paris.

### *To Name ZRS-5 "USS Macon"*

THE ZRS-5, the airship now being built at the Goodyear-Zeppelin Corporation plant in Akron, Ohio, will be christened *USS Macon*, in honor of the city of Macon, Georgia, the Secretary of the Navy has announced.

The ZRS-5 is scheduled for completion in January, 1933. She is at present being constructed as a sister ship of the *USS Akron*. Studies have been made and discussions have taken place as to the possibility of increasing the size of the ZRS-5 from six and one-half million cubic feet to seven and one-half million cubic feet, which change would insure the United States' keeping in the forefront of lighter-than-air development. This question has been referred to the House Naval Affairs Committee.

### *Balloon Flier Becomes Plane Pilot*

MAJ. WILLIAM E. KEPNER, winner of the 1928 international balloon race, graduated as an airplane pilot a few days ago from the Army Air Corps Advanced Flying School at Kelly Field, Texas. Previous to his course at Kelly Field, Major Kepner already had acquired the ratings of airship pilot, balloon observer and airplane observer.

### *Cross-Country Flight at 20,000 Feet*

A CROSS-COUNTRY flight at an altitude of 20,000 feet was made recently by the 94th Squadron from Selfridge Field, Mt. Clemens, Mich., to Washington, D. C. The flight was made in Boeing Wasp-powered fighting planes in two hours and five minutes, at an average speed of 200 miles an hour. Following the trip, flight officers decided: That planes and engines function satisfactorily at the high altitudes with a little training of personnel; pilots flying at the extremely high elevations become chilled after remaining up for an hour; liquid oxygen is more satisfactory than gas oxygen.

### *Navy May Sell Los Angeles*

REQUESTS already have been received by the Navy for the purchase of the *Los Angeles*. It is reported that the Navy wishes to sell the big airship, partly because it wishes to acquire funds to enlarge the ZRS-5, now under construction, and partly because there will not be hangar space for both the *Los Angeles* and the ZRS-5, when the latter is completed.

### *Air Force Proves Worth in Hawaii*

THE ABILITY of the Air Corps to make long flights from the Hawaiian Islands in any sort of weather to locate and attack enemy vessels and naval aviation was proved in the recent war games at Hawaii, according to Army officials. Three hundred and twenty-four airplanes were used in the maneuvers, 220 by the victors, the attacking "Blues," and 104 by the defending "Black" forces.

Army airplanes during the maneuvers flew over 26,000 miles, most of the distance above water and much of it at night. Only three planes reported forced landings because of engine trouble. Although 181 airplanes were judged destroyed, only two were really lost, without human death or injury, however. In one aerial fight alone more than 100 planes were reported to be engaged.

### *Hurley Plane to Have New Radio*

SECRETARY OF WAR Patrick J. Hurley has sent his tri-motored Ford monoplane, in which he makes official trips, to the Army Air Corps laboratories at Wright Field, Dayton, Ohio, for the installation of a special radio transmitting and receiving unit of extraordinary power. This set will enable him to communicate directly with WAR, the War Department station in Washington, while he is flying anywhere in the United States. Previously the plane had had the ordinary type of airplane two-way radio telephone, with which it was Secretary Hurley's custom to establish contact with the nearest Army or Department of Commerce radio station, asking if it had anything to transmit from WAR.

# Boeing training is built on flying 37 million miles with the Air Mail

THE EQUIVALENT of 1480 around-the-world flights, all on its own affiliated air lines, in addition to one million miles of student instruction flying, is an incalculable advantage to be brought you by your flying school.

It means that your training, from the ground up, will be built on *facts*.

Boeing School of Aeronautics has a larger regular enrollment than any other recognized school. Its fleet of eight training planes includes the famous Boeing 40-C2, the eight-place Hamilton all-metal cabin monoplane, Stinson Junior cabin monoplane, the Boeing 81 trainer, the new Stearman trainer, and the famous Boeing 203 trainer—powered with

motors ranging from 165 H. P. to 425 H. P. It comprises the most modern laboratories, class-rooms and shops ever grouped in one school. Located in California, on the famous Oakland Municipal Airport, it has the advantage of all-year flying weather.

The Boeing School is definitely built to meet the *future* of aviation, backed by the manufacturing and transport organization with the world's largest stake in that future. From the start, it will pay you to turn this standing to your own advantage.

A bulletin of courses, costs and facilities will be mailed you upon request. Compare our courses with those offered elsewhere before choosing your school.

*Next regular enrollment, April 4, 1932*

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|---|---|
| <input type="checkbox"/> Private Pilot            | <input type="checkbox"/> Boeing Master Pilot                            |
| <input type="checkbox"/> Limited Commercial Pilot | <input type="checkbox"/> Boeing Master Mechanic                         |
| <input type="checkbox"/> Transport Pilot          | <input type="checkbox"/> Special Master Pilot<br>(For Transport Pilots) |

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City \_\_\_\_\_ State \_\_\_\_\_



The first  
**BOEING** flying boat  
outlasted *seven* engines\*

After nine years of air mail service between Seattle and Victoria—1919 to 1928—totaling more than 500,000 miles, this staunch ancestor of later commercial models was *still* in air-worthy condition — another instance of Boeing construction years ahead of its time. . . . Boeing Airplane Company, Seattle, Subsidiary United Aircraft & Transport Corporation.



\* **BOEING**  
has *always* built  
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**TO-DAY**

# AERONAUTICAL INDUSTRY

## *Cleveland School Announces Contest*

CAPTAIN FRANK HAWKS, Amelia Earhart and L. W. Greve, president of the National Air Races, are among the judges for the scholarship contest recently announced by the Cleveland Institute of Aviation. Ten awards, to be given in the form of instruction valued at \$1,105, are offered for the best essays submitted by April 1 on one of two aviation topics. The contest is open to girls as well as boys of northeastern Ohio. "The Greatest Feat in Flying in 1931" or "The Outstanding Development in Aviation in 1931" are the subjects between which the contestants may choose. Names of winners will be announced May 15.

The essays are to be 500 to 1,000 words in length and may be accompanied by diagrams, maps or charts. The competition is open to students in high schools and other secondary schools in northeastern Ohio who are 16 years of age and to those graduated since January, 1931.

## *Air Race Events Open to Women*

THE equality of the sexes in aviation racing events will be recognized for the first time at the National Air Races to be held at Cleveland, Ohio, next August, according to an announcement by Clifford W. Henderson, managing director. The ability of women pilots to compete favorably in the closed course races with men pilots was recognized at the first national zoning meeting of pilots and manufacturers held in Washington recently to discuss the 1932 National Air Racing program.

During previous National Air Races the activities of women pilots have been confined in the main to aerobatics, closed course races and cross-country competition among their own sex. This year all events in which men pilots can enter will also be open to them. This leaves the Aero Trophy Race feature free-for-all high-speed competition for women as the exclusively feminine race event on the 1932 program.

## *Allard Now C-W Sales Manager*

THE appointment of John S. Allard, president of the Curtiss-Wright Flying Service, as vice president in charge of sales for the entire Curtiss-Wright Corporation has been announced by Thomas A. Morgan, president of the corporation. Mr. Allard, in addition to his duties with the Flying Service, will coordinate the sales activities of all the subsidiary companies, which include Wright Aeronautical Corporation, Curtiss Aeroplane & Motor Company, Keystone Aircraft Cor-

poration, Curtiss-Wright Airplane Company, Curtiss-Wright Export Corporation and the Curtiss-Wright Flying Service. Advertising, publicity, and statistics will come under his direct supervision.

## *Air Mail Users Led By Pacific Coast*

PACIFIC COAST business firms and individuals are the largest per capita users of air mail in the United States, it was shown in figures compiled by postal authorities. During 1931, the survey showed, more than 406,000 pounds of air mail were transported between Seattle, Wash., San Diego, Calif., and intermediate points, an increase of 116,000 pounds over 1930.

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## COMING AERONAUTICAL EVENTS

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March 7-11. Group meetings of American Society for Testing Materials committees at Cleveland, Ohio.

March 9. Cleveland Regional Meeting of American Society for Testing Materials.

March 24-27. New Orleans Air Carnival under the direction of Famous Fliers, Inc.

April 2-10. National Aircraft Show of 1932, sponsored by the Aeronautical Chamber of Commerce of America, Inc., at City Airport, Detroit, Mich.

May 16-22 (Changed from March 14-20). Northwest Aircraft Show, St. Paul, Minn.

May 22-30. International Reunion of Trans-oceanic Fliers, under the auspices of the Royal Aero Club of Italy, at Rome.

June 20-24. Annual Meeting of American Society for Testing Materials, Atlantic City, N. J.

July 18-31. National Gliding and Soaring Contests under the sponsorship of the American Soaring Association, Inc., at Elmira, N. Y.

August. National Air Races at Cleveland, Ohio.

November 25-December 11. Thirteenth International Aeronautical Exhibition, under the auspices of the Syndical Chamber of Aeronautical Industries, in the Grand Palais, Paris, France.

## *New Orleans Air Carnival*

APPROXIMATELY 200 aircraft, including Army and Navy ships, are expected to attend the New Orleans Air Carnival under the direction of Famous Fliers, Inc., March 24-27. Attempts will be made to set a new landplane record. Among fliers reported to have accepted invitations to participate are: Clarence Chamberlin, Wiley Post, Clyde Pangborn, Frances Harrell, Betty Lund, Dorothy Hester, Frank Hawks, J. Wedell, J. Doolittle and Tex Rankin.

## *To Operate Air Show Air Line*

A FREQUENT service airline that is scheduled to operate over an international route of approximately sixty miles within the vicinity of Detroit, will be a feature of the 1932 National Aircraft Show at Detroit, Mich., April 2 to 10, according to official announcements. Transport planes will leave Detroit City Airport, where the show is to be held, half-hourly or more frequently. Stops will be made at Ford Airport, Wayne County Airport, Grosse Ile Airport and Walkerville, Ontario. Passengers will be picked up or discharged at any of the scheduled stops. The fare around the circuit will be approximately five dollars.

The official pre-view this year will take place in the forenoon of April 2, from 10 o'clock until noon, rather than in the afternoon. Guests will be entertained at a breakfast instead of a luncheon.

## *Robertson and Von Hoffman Unite*

CONSOLIDATION of the Robertson Airplane Service Company and the Von Hoffmann Aircraft Corporation, both located at Lambert-St. Louis Field, St. Louis, Mo., was announced February 18 by Frank H. Robertson, who will direct the concern formed by the merger. The Von Hoffmann Air College will be discontinued on July 1, when the present students complete their courses.

Bernard Von Hoffmann, who succeeded his father as head of the Von Hoffmann company, becomes a stockholder and director of the Robertson company through the consolidation. The merged companies operate six storage and service hangars at the St. Louis municipal airport. A general aviation business will be carried on, including the sale and overhaul of standard types of planes and engines, aerial sight-seeing and charter flights, photography, and local servicing of Transcontinental & Western Air ships, as well as service to the transient and local trade. Part of the Von Hoffmann service personnel will be retained.

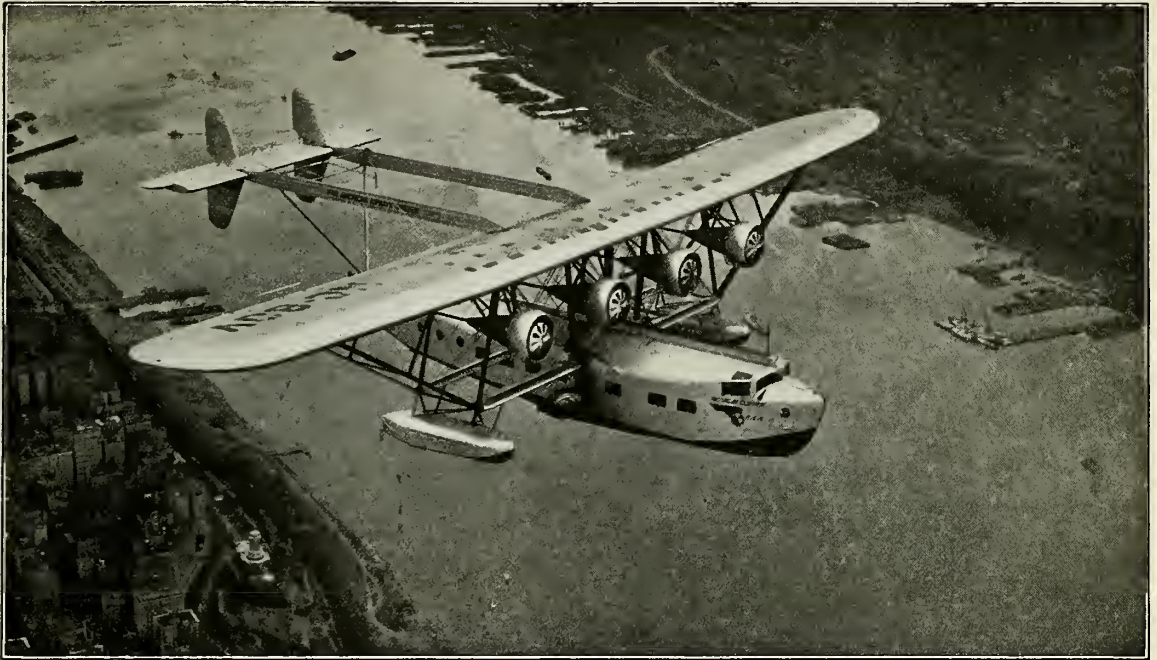


Photo by Fairchild Aerial Surveys, Inc.

# Linking the Americas

**H**IGH above the Hudson's waters, the flagship of Pan American Airways circles in final salute to Gotham as she noses toward the Carribean.

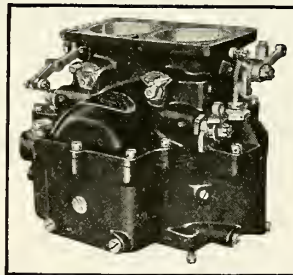
This 45 passenger Sikorsky is the largest amphibian in the world. Linking the Americas is her regular job. And since her maiden voyage with Col. Lindbergh at the controls, she has performed it dependably, trip after trip.

Every flight the American Clipper makes is a Stromberg responsibility. Four Stromberg Carburetors supply the fuel mixture for her engines—2300

horsepower total. An outstanding example of Stromberg dependability contributing to Pan American dependability.

The American Clipper is but one of many Pan American planes—all types—that depend on Stromberg Carburetors. In fact, 95% of the planes flying in the United States today are Stromberg-equipped.

If you have a carburetion problem, let us know. Our engineers would like to coöperate. There is a Stromberg Carburetor for every type and size of plane.



Stromberg NA-Y8C Carburetor double barrel type. Weight 15 pounds. Barrel diameter 2 15-16 inches. Capacity (approximate) 650 H. P.

*There are four of these carburetors on the ship shown in the photograph*

# STROMBERG CARBURETORS

BENDIX STROMBERG CARBURETOR COMPANY

« SUBSIDIARY OF BENDIX AVIATION CORPORATION »

701 BENDIX DRIVE, SOUTH BEND, INDIANA

### **Department of Commerce Figures Show Number of Planes and Pilots**

A TOTAL of 17,739 pilots, 7,553 aircraft and 9,016 mechanics held active Department of Commerce licenses on January 1, 1932, according to a study just completed by the Aeronautics Branch of the Department of Commerce. In making this announcement today, Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, said there had been a growth in the aircraft and pilot classifications since the date of the last survey, July 1, 1931, when there were 16,268 licensed pilots and 7,458 licensed aircraft.

The total number of aircraft, licensed and unlicensed, of which the Branch had record on January 1, was 10,780, as compared with 10,235 on July 1, 1931. Unlicensed craft (bearing identification numbers only) numbered 3,227 on the first of January, as against 2,777 on the first of July.

Among the 17,739 persons holding pilots' licenses as of January 1, 6,881 were of the transport grade, 1,586 held limited commercial licenses, 46 were industrial pilots, and 9,226 in the private classification. The licensed pilots included 532 women, whose licenses were divided as follows: Transport, 42; limited commer-

cial, 56; industrial, 1, and private, 433. The 9,016 mechanics included 5 women.

Leading the states in number of aircraft was New York, with 1,227. California was second, with 1,186, and Illinois, third, with 734.

In number of licensed pilots, California led, with 3,327; New York was second, with 1,820, and Illinois, third, with 1,128. California also led in number of licensed mechanics, with 1,644; followed by New York, with 860, and with Illinois' total of 549 third.

The study also included gliders and glider pilots. It was found that the number of licensed gliders was 89, and unlicensed gliders, 1,181, making a total of 1,270. Licensed glider pilots numbered 267. The greatest number of gliders in a single state was in California, where there were 238. New York was second, with 132, and Michigan, third, with 120. California also led in number of licensed glider pilots, with 87, while New York had 58, and Illinois was third, with 14.

## **DIGEST OF RECENT EVENTS**

### *A Brief Chronological Summary of the Month's Important Aeronautical News*

#### **Record-Breaking Hanoi-Paris Flight**

PAUL CODOS and Henri Robida, French aviators, flew from Hanoi, French Indo-China, to Paris, France, 11,000 kilometers, in three days, four hours and ten minutes. (January.)

#### **Sets Seaplane Altitude Record**

A FRENCH aviator, M. Perriot, set a world's record for altitude in a seaplane carrying a load of 2,000 kilograms. He reached a height of 6,700 meters. (Jan. 30.)

#### **Dedicate French Memorial to Wilbur Wright**

U. S. AMBASSADOR and Mrs. Walter Edge participated with French officials in the dedication of a monument to Wilbur Wright at Pau, France, where he opened his first aviation school. (Jan. 30.)

#### **Seeks to Promote Dirigible Fleet for International Trips**

LEGISLATION providing for airships most of the rights now enjoyed by transoceanic steamships was introduced into Congress by Representative Crosser of Ohio. Representative Crosser pointed out that competition for leadership in international air travel is quickly approaching, and the establishment of passenger lines under the American flag is the next logical step. (Feb. 1.)

#### **Urges Use of Parachutes on Commercial Lines of New York**

REPRESENTATIVE CELLER of New York introduced a bill providing for the compulsory individual use of parachutes on all commercial airlines. (Feb. 3.)

#### **Radio Rights Given Air Mail Operators**

SIX NEW JERSEY radio stations controlled by air mail operators received

state licenses. The stations are located at Newark Airport, Central Airport, Camden; Atlantic City and Linden. (Feb. 3.)

#### **Declares New Jersey Aviation Act Void**

THE STATE AVIATION ACT of 1931 was held to be unconstitutional by Common Pleas Judge Richard Harts-horne of Newark, N. J., who gave as the reason for his decision that the act delegated legislative power to the New Jersey Aviation Commission. The act provides for all planes and pilots to be federally licensed and imposes regulations on insurance and airports.

#### **New Diesel Altitude Record**

RUTH NICHOLS flew in a Diesel-powered monoplane to a height believed to be 21,350 feet, making a new altitude record, according to altimeter reading. Miss Nichols made the flight in the same ship in which Clarence Chamberlin broke the altitude record on January 24, officially reaching 19,393 feet. (Feb. 14.)

#### **Doolittle Makes Another Record**

TRANSPORTING a cargo of films showing the Japanese occupation of Shanghai, Major James Doolittle flew in a Lockheed Vega from Cheyenne, Wyo., to Newark, N. J., in the record time of eight hours and thirty minutes. The distance covered was 1,650 miles, making an average speed just under 200 miles per hour. (Feb. 18.)

#### **Akron Investigation Closed**

REPRESENTATIVE James V. McClintic of Oklahoma, chairman of the Congressional committee investigating alleged defects in the Naval dirigible, *Akron*, announced that no report would be written. The decision took place, he said, since the accident to the *Akron* on the previous day, which prevented a trip of inspection planned by the committee. (Feb. 23.)

#### **Continental Aircraft Changes**

ACCORDING to Robert Insley, vice president and general manager of Continental Aircraft Engine Company, H. R. Alexander has been promoted to the position of sales and service manager. N. N. Tilley, formerly of American Airplane and Engine Company, has been appointed chief design engineer.

#### **Start Flying Class at Hancock Foundation**

A FLYING CLASS was started on February 1 at the Hancock Foundation College of Aeronautics and will be comprised solely of men now taking engineering courses at the college. A number of engineering students are already taking private pilots' courses as a laboratory subject, and this policy will be recommended in the future by the college as a means of affording engineering students an opportunity to learn the practical side as well as the theoretical side of flight conditions.

The second semester started the first of February, with many new courses being offered. An eighteen months' course in radio and one of equal duration in aerial navigation are being offered, together with highly intensive courses in engine mechanics and airplane welding.

A class consisting of three transport pilots and four mechanical students, recently took their Department of Commerce examinations for their licenses and received their letters of authority. The four mechanical students will remain indefinitely, obtaining practical experience while employed as helpers in the Hancock repair shops. Two mechanical students also completed their academic work at the same time and will continue working for some time before taking the Department of Commerce examination for a mechanic's license.

# WANT A BOMB?

## REAL WORLD WAR AIRPLANE BOMBS



FOR 10 years I have been going to U. S. Government sales at Arsenals, Navy Yards and Army posts to find some real authentic World War airplane bombs that I could buy at a figure which would enable me to sell them at a reasonable price. Dozens of fellows have written me and asked me if I couldn't secure such a relic for their collection. When I had just about given up all hope I came across a party who said he had 2000 World War bombs. But he was too optimistic. We counted them and found that he didn't have as many as he thought he did. Actually, there were only 89 small ones, 177 medium size ones, and 96 large ones. Just think! Less than 400 fellows can be the lucky purchasers of these airplane bombs. I am positive that there are no more bombs like these in this country. Send your order now. Don't wait a minute. All sizes are still available. I know they'll sell fast. Soon they'll be gone. Use the coupon today!

No. 1—24" long; weighs 14 lbs. Price \$5.00.  
 No. 2—36" long; weighs 24 lbs. Price \$4.00.  
 No. 3—48" long; weighs 48 lbs. Price \$7.00.

### HERE'S WHAT YOU CAN USE THEM FOR:

- A fine ornament for the mantelpiece!
- They will make a dandy smoking stand!
- Splendid andirons for your fireplace!
- Add a little touch to your Den!
- Make a fine base for a table or floor lamp!
- Not bad as a candle stick!

Mail me one thin dime and your address on the coupon and I'll send you my new 1932 catalog. It will save you dollars!

**HERE'S YOUR COUPON—USE IT NOW!**

Pin money-order, cash or check to coupon and mail today.  
**KARL ORT, 628 W. Poplar St., York, Pa.**

Dear Ort: Your real airplane bombs are just what I was looking for.

Enclosed find \$..... Please express me .....  
 of them as marked below.

.....No. 1	Total .....
.....No. 2	Total .....
.....No. 3	Total .....

Name .....

Street .....

City ....., State .....

### Statistics on American Airplanes

AIRPLANES manufactured in the United States during 1931 totaled 2,800, of which 1,807 were for domestic civil use, according to statistics announced by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The figures are based upon licenses and identification marks issued to unlicensed airplanes recorded by the Department of Commerce, and on reports on military deliveries and airplanes exported. This is exclusive of craft manufactured during 1931 for which licenses or identifications have not yet been sought.

Several companies building autogiros produced a total of sixty craft of this type in 1931. Licensing of autogiros began during the past year.

The 1,807 airplanes manufactured for domestic commercial or civil use during 1931 were produced by 347 firms or individuals. Three companies produced 100 or more airplanes each. Each of five companies manufactured 50 to 99; nine companies manufactured 25 to 49 each; 10 companies manufactured 10 to 24 each, and 36 companies produced between two and nine each. There were 284 companies or individuals producing one plane each during the year.

Almost three monoplanes were manufactured for every biplane, the totals being 1,296 and 450, respectively. Thirty-eight seaplanes and amphibions were listed among them.

The 1,807 airplanes built for civil use included 1,283 which were licensed under 123 Approved Type Certificates by 46 manufacturers and 65 which were approved for license in accordance with the provisions of Group 2, which is for aircraft manufactured in limited numbers. Of the remainder, 80 were licensed as experimental craft, 15 received restricted licenses and 364 were identified without licenses.

Engines used in the 1,283 planes manufactured under Approved Type Certificates included 678 of less than 100 horsepower; 284 of horsepower between 101 and 200; 255 with between 201 and 300 horsepower; 41 with between 301 and 500 horsepower. Sixty of the Approved Type Certificate airplanes were multi-engined.

The busiest months for aircraft builders, in regard to licensing or identifying their product, were May and June. In each of these two months reports on 360 completed craft were received by the Aeronautics Branch.

### Organize Papin Aerial Surveys

THE Papin Aerial Surveys has been organized as a subsidiary of the P. R. Papin Photo Co., 1901 Lucas St., St. Louis, Mo. H. B. Weeks, manager of the new business, has had ten years' experience in the aerial photographic field. He is assisted by two production engineers with years of experience on aerial

mosaic layout and "Shorty" Chaffee, as pilot and mechanic.

The All-Purpose Aerial Survey is designed to meet the requirements of any one interested in securing an accurate photographic replica of the earth's surface. The user may secure any sections of the survey at scales ranging from 1" equals 100', to 1" equals 1 mile. It is also made through the cooperative purchase plan, thereby dividing the costs proportionately and making it possible for each user to secure his survey at prices lower than ground survey.

A unique service to clients is taking the engineer in charge of any project for an airplane trip over the area, giving him an opportunity to make a speedy, yet thorough reconnaissance and a "bird's-eye view" of the territory to be covered.

### Warner Acquires Aircraft Products Corp.

ANNOUNCEMENT has been made by W. O. Warner, president of the Warner Aircraft Corporation of Detroit, of the acquisition by that company of the assets of the Aircraft Products Corporation, also of Detroit.

The management of the company will be in the hands of W. O. Warner as president, Ralph R. Irwin, vice president in charge of sales, and W. J. Jarvie, secretary-treasurer. These will also comprise the directorate of the company, together with William B. Mayo, chief engineer of the Ford Motor Co.; William B. Stout, president of Stout Engineering Laboratories, Inc.; George M. Holley, president of the Holley Carburetor Co.; E. N. Hartwick and L. A. Majneri.

### Embry-Riddle Headquarters Moved

ST. LOUIS, MO., will become the focal point of operations for American Airways, Inc., beginning March 1, when the headquarters of the Embry-Riddle Division of the line will be removed from Cincinnati to that city. The Embry-Riddle Division is being combined with the Universal Division of American Airways, now located there. The merged group will be known as the Central Division of American Airways, Inc., and will be in the charge of Col. Halsey Dunwoody, at present manager of Universal.

The new division will have supervision of the operations of approximately half the mileage of American Airways, according to Colonel Dunwoody. The total mileage over which the company now operates is 8,625, reaching fifty-eight large cities. Twenty-nine of these are in the new Central Division territory. The American Airways lines extend from coast to coast and from Canada to the Gulf of Mexico. In addition the company operates an Alaskan subsidiary.

It is expected that the consolidation of the two divisions of the company will bring approximately three-fourths of the 130 employees of the Embry-Riddle Division to St. Louis.

### Berry Brothers Plan Air Show Exhibit

MODEL machinery, showing the actual grinding and manufacture of paints, will be a feature of the Berry Brothers exhibit at the All-American Aircraft Show in Detroit, Mich., April 2 to 10. Another feature of the display will be a spray booth in operation, with a practical aircraft finisher applying Berry materials.

### Curtiss-Wright to Handle Aeronca Sales

NEGOTIATIONS between the Aeronautical Corporation of America, Cincinnati, Ohio, manufacturers of Aeronca airplanes, and the Curtiss-Wright Flying Service have resulted in an agreement whereby the Flying Service will handle the national sales and service distribution of the Aeronca, according to an announcement by John S. Allard, president of the Curtiss-Wright Flying Service. Distribution will be made through the thirty Flying Service bases and also through the 387 dealers associated with the Flying Service. Arrangements have been made through R. B. Galloway, vice president of the Aeronautical Corporation, to place demonstrators at several strategic points throughout the country. Mr. Allard pointed out that a similar agreement had recently been completed with Monocoupe and Bird, and that the Flying Service would continue to distribute the products of the Curtiss-Wright Airplane Company, including the new series of Travel Air Speedwings, powered with the 240, 300 or 400 Wright Whirlwinds, the Light Sport and Sports Trainer, the Travel Air 6000, and several new models yet to be announced.

### New Fairchild Dealers Appointed

THE following dealers have recently been appointed to handle Fairchild planes:

Montgomery School of Aeronautics, Montgomery, Ala.; North State Aviation, Inc., Salisbury, N. C.; Weeks Aircraft Corp. of N. C., Charlotte, N. C.; Blevins Aircraft Corp., Atlanta, Ga.; The Glenn E. Messer Co., Birmingham, Ala.; State Airways, Thomasville, Ala.; Southern Aircraft, Inc., Valdosta, Ga.; Little-Greiner Flying Service, Inc., Springfield, Ohio; Tred Avon Flying Service, Inc., Easton, Md.; Tuscarawas County Aviation, Inc., New Philadelphia, Ohio; Otto & Thomas, Coatesville, Pa.; York Flying Service, Inc., York, Pa.; Unger Aircraft, Inc., New Brunswick, N. J.; Hudson Valley Flying Club, Inc., Newburgh, N. Y.; Norwich Flying Service, Inc., Norwich, N. Y.; Giroflyers Ltd., Poughkeepsie, N. Y.; Hildreth-Presley Co., White Plains, N. Y.; Glove City Airways, Inc., Gloversville, N. Y.; Brocton Air Service, Inc., Brocton, N. Y.; Salt City Air Service, Inc., Syracuse, N. Y.; The Victory Aero Co., Kansas City, Mo.; R. L. Hahn, Tulsa, Oklahoma.





# THE TAYLOR CUB

## A ship that has proved itself

**T**HE TAYLOR "CUB" has proved its worth in student instruction and private flying and fills an obvious need in Aviation. The low price of \$1325 opens an enormous market heretofore untouched. It is the most outstanding value ever offered—a real airplane with full size, comfortable, draft-proof cockpit, low pressure tires and standard instruments, built for strength and performance, perfectly stable in every maneuver and an honest landing speed of 26 miles an hour. For these reasons, the TAYLOR "CUB" stands alone in a class which it has made for itself. A full quality airplane for less than \$1500—much less. It is the common sense plane for flying school, flying club, and pleasure flyer alike. Dealers and distributors, don't pass this opportunity by. It is your chance to show a big profit for 1932. Some valuable territory still open. Write or wire at once. Let us help you get under way before the Detroit Show and make the most of 1932.



**Easily Accessible**  
**Excellent Vision**  
**A.T.C. No. 455**  
**Comfortable**  
**Convenient**

**\$1325 FLYAWAY FIELD**  
**With Continental A-40 engine**

TAYLOR AIRCRAFT COMPANY  
 FLY *Taylor*made AIRPLANES Bradford, Penna.

### The W. E. Boeing Scholarships

FOUR scholarships, representing a total of \$7,375 in tuition value at the Boeing School of Aeronautics, exemplify one method of furthering the cause of aeronautical education, as employed by William E. Boeing of Seattle, Washington. Mr. Boeing is chairman of the Board of United Aircraft and Transport Corporation and founder of the Boeing Airplane Company and of the Boeing Air Transport and allied companies.

The scholarships are offered to undergraduate students of American colleges and universities who can show from their school president or dean a scholastic record which ranks them in the upper half of their class for the period of their college attendance. The scholastic requirement is not a positive assurance, but it is at least an indication of the prospective aviation student's mental ability, application and appreciation of his opportunities. With an understanding of the importance of the physical and social qualifications of the candidates for the scholarships, the Boeing School also takes an interest in their extra-curricular activities as furnishing evidence of satisfactory physique, sporting team play and leadership. The college or university from which the student comes must offer at least a bachelor's degree in arts or sciences.

The award of the scholarships is based upon an original essay of not more than 2,000 words, to be written by the contestant on some subject relating to aviation. Five topics are suggested, though competitors may, if they desire, select their own, after having them first approved by the National Committee of Award.

Winners of the W. E. Boeing Scholarships are selected by the National Committee of Award, under the chairmanship of Dr. B. M. Woods, head of the department of mechanical engineering of the University of California. Associated with Dr. Woods on the committee are two outstanding leaders in educational and aeronautical circles. The committee grades the essays on four points, which do not, however, rate as equally important. These are: Subject matter, analysis and conclusions, literary merit and choice of topic. The total grades of these four points add up to the individual judge's estimate of each essay. The average of the estimates of the three judges determines the winners.

The competitor who receives the first award, provided he can pass the Department of Commerce transport pilot physical examination, is given the complete Master Pilot Ground and Flying Course in the Boeing School of Aeronautics. The total tuition for this course is \$5,275, and it includes 924 hours of ground school instruction and 204 hours of flying.

Winners of the second, third, and fourth places are given their choice of the Master Mechanic Course, which offers 1,444 hours of ground school instruction at a tuition cost of \$700; the Master Pilot Ground Course, with 924 hours of ground school instruction at a tuition of \$625, and the Private Pilot Ground and Flying Course, which includes 105 hours of ground school instruction and twenty-two hours of flying at a tuition cost of \$645. The maximum possible value of the second, third and fourth awards is thus \$2,100. Out of six winners of these three prizes over a period of two years, three have selected the Master Mechanic Course, and it is possible that in any one year all three such winners might make this choice.

Awards are for the complete tuition costs of these courses. All courses so given, with the exception of the Private Pilot Ground and Flying Course, require nine months for completion.

The scholarships serve a three-fold purpose. They make it possible for certain ambitious young men to receive the training necessary to enter the vocation of their choice; they recruit to the aviation industry desirable personnel which would probably otherwise be unavailable, and they stimulate original research and study along aeronautical lines.

### Boeing Airplane for Pratt & Whitney

THE PRATT & WHITNEY Aircraft Company has taken delivery on a new Boeing single-seater plane, type 100-F. This ship will be used by the engine manufacturing company to perform the experimental flight test work necessary in the development of their new engine models. It supplants the old Boeing model 100, which has been retired because of obsolescence in this type of work.

The Boeing model 100-F is a counterpart of the latest design for the United States Army pursuit planes and the United States Navy attack ships. It is of an all-metal fuselage construction and is equipped with a tail wheel instead of the skid of the former models.

On its flight East from the Boeing factory in Seattle to Rentschler Field in Hartford, the plane was powered with a supercharged Wasp engine, series S-C-1, with a rated horsepower of 450 at 6,000 feet at 2,100 revolutions per minute. It was piloted by Pratt & Whitney's chief test pilot, A. Lewis MacClain, who expressed pleasure with the ship's performance. His flight from Seattle to Hartford, covering a distance of 2,962 miles, was made in seventeen hours and five minutes, at an average speed of 173.6 miles per hour. He negotiated the 477 miles between Cleveland and Hartford in the record time of two hours and twenty minutes, averaging 205 miles per hour.

### Time to Return Questionnaires

AIRCRAFT manufacturers are now being asked by the Bureau of the Census to fill out and return promptly the Census of Manufactures questionnaires which have been distributed recently by the Bureau. A special effort is being made in order to reduce the cost of the work. If all the returns can be collected by mail, it will obviate the necessity of sending special agents to call on the establishments. The questionnaires for the current census are somewhat shorter than those used for 1929. Most of the inquiries are simple, and it is believed that, as a rule, aircraft manufacturers will have little difficulty in supplying from their books the figures requested.

### Ex-Cell-O Transfers Representatives

TERRITORIES covered by Ex-Cell-O Aircraft & Tool Corporation's Dayton and Chicago offices have been recently rearranged. William H. Scheer, who was formerly in the Dayton territory, working out of Cincinnati, has been transferred to the Chicago office and will be covering Northern and Western Indiana and the Southwestern portion of Michigan. H. E. Henry, who was formerly working out of the Cleveland office, has been given charge of this territory, and his new address will be 1240 Bender Avenue, East Cleveland, Ohio. Frank Strother, formerly in charge of the Cleveland territory, has been transferred to the home office in Detroit.

### New Autogiro Concern

FUTURE production of an entirely new line of autogiro aircraft is foreshadowed in the appointment of the F. W. Steere Company, now of White Plains, N. Y., as a licensee manufacturer of the Autogiro Company of America, it has been announced. The Steere Company's manufacturing facilities will be established in the Middle West.

F. W. Steere, head of the concern, is a former public utilities executive and organizer of the Steere Engineering Company of Detroit, specialists in the design and construction of gas plants and by-product equipment. Heading the technical department of the concern will be Heraclio Alfaro as vice president and chief engineer. Mr. Alfaro took his pilot's license in France during 1911 and built several of the first airplanes of Spanish manufacture. He has been actively associated with both design and business phases of autogiro work in America for the past two and a half years.

The F. W. Steere Company is the fourth to enter the autogiro field, the other concerns being the Buhl Aircraft Company of St. Clair, Mich., the Kellett Aircraft Corporation of Philadelphia and Pitcairn Aircraft, Inc., of Willow Grove, Pa.

### Plane Helps Fill Rush Order

A COMBINATION of telephone and airplane recently enabled the Russell Manufacturing Company, Ltd., St. John's, Que., Canadian plant of the Russell Manufacturing Company, Middletown, Conn., makers of Rusco brake linings and other automotive products, to break all records filling an emergency order for airplane shock cord for Canadian government mail planes, averting a serious delay in Canadian air mail transportation.

### Ruth Nichols Makes New Altitude Record

RUTH NICHOLS, holder of the speed, altitude, and transcontinental records for women, climbed to a height of approximately 21,350 feet at Floyd Bennett Field, Brooklyn, February 14, in the same Diesel-powered monoplane recently used by Clarence Chamberlin in his altitude record flight. Charles H. Gale of the National Aeronautical Association, taking the barograph for shipment to Washington, said the position of the needle indicated a height of more than 21,350 feet.

Miss Nichols declared she had not needed to resort to oxygen inhalation until she had reached 20,000 feet, at which point the thermometer registered fifteen degrees below zero.

The altitude flight was one of a series of experiments being conducted at Floyd Bennett Field by Chamberlin and Miss Nichols, using this Diesel-motored Lockheed Vega, which burns ordinary furnace oil. The experiments so far have proved successful.

### Gatty Joins U. S. Air Corps

HAROLD GATTY, Australian 'round-the-world flier, was sworn in recently as senior aerial navigation research engineer for the Army Air Corps. He will be stationed at Wright Field, Dayton, Ohio. A drift and ground speed indicator designed by Gatty and used in the Post-Gatty flight around the world is being developed by the Army and Navy.

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## NORTHEAST

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ERECTION of a modest administration building, erection of bleacher accommodations for at least 3,500 persons and the installation of a lighting system outlining the landing field at the Rhode Island State Airport are recommended in the annual report of the State Airport Commission, recently filed with the legislature. Senator Bodwell, chairman of the Commission, said he would present a bill calling for additional appropriations to cover the proposed improvements.

Of a total of \$372,164 made available

to it, the Airport Commission, up to Jan. 14, had spent \$337,739, according to the report. The report states that 3,217 passengers have been carried in the course of 1,012 hours of recorded flying time since the dedication of the field on September 26, 1931.

WEBSTER KNIGHT, 2nd, has been elected president of the Glider Section, Rhode Island Aviation League. He succeeds Col. Thomas J. H. Peirce, who was named chairman of the executive committee.

A program calling for a twenty-fold increase in glider activities this year was indorsed by members of the section. This program has the goal of 10,000 tows and flights, beginning February 1 and ending July 31. A campaign with a double membership goal was begun on February 1, with Arthur L. Lawrence, secretary-treasurer, in charge.

THE Airport Operators' Association of Rhode Island was organized at a meeting of airport operators in the Providence Chamber of Commerce building on February 12. The new association includes the following members: Southern New England Flying Service, Inc., What Cheer Airport; Providence Air Transport, Inc., Providence Airport; E. W. Wiggins Airways, Inc., and Wings Incorporated, Rhode Island State Airport. Arthur L. Lawrence was elected secretary of the association.

The organization will open a ground school, with Earl Southee of the Curtiss-Wright Flying Service as instructor. Sessions of the school will begin on March 2, with a public meeting in the evening, the course lasting sixteen weeks.

TWENTY students have enrolled in the North High School Aero Club, Columbus, Ohio. The organization is headed by John Mallory and George Ginn. The club is associated with the American Air Cadets.

STANLEY C. HUFFMAN, operations manager of the Embry-Riddle division of American Airways, Cincinnati, Ohio, has announced his resignation.

AUTOGIRO flights were recently made available to the public in the vicinity of Philadelphia, Pa., by Pitcairn Aviation, Inc. Pitcairn Autogiros were operated from Pitcairn Field, located above Willow Grove, Pa.

W. LAWRENCE SAUNDERS, 2nd, was re-elected recently to serve his fourth term as president of the Aero Club of Pennsylvania.

Other officers chosen were: Graham S. Mason, first vice president; L. P. Sharpless, second vice president; William H. Sheahan, treasurer; Percy

Pierce, secretary, and Lewin B. Barringer, assistant secretary.

A NEW type of signal gun for warning pilots on the ground of the approach of other planes was recently tested at Central Airport, Camden, N. J. The new device, which has been developed by the Bureau of Standards, will be tested elsewhere upon completion of trials at Central Airport.

A WACO F was recently purchased by the Pennsylvania Aeronautics Commission for use in furthering its activities. The ship, bought from the Wings Corporation, is finished in the colors of the state, with a blue fuselage and yellow wings.

A NEW wind T was recently installed at Central Airport, Camden, N. J. A novel feature of the T, which is visible at a distance of three miles from the airport, is that in addition to showing the direction of the wind, it also indicates its velocity by means of lights. The lights on the T show green in a wind blowing less than ten miles per hour, green and amber in a wind of twenty or less than twenty miles per hour, and amber when the wind velocity is more than twenty miles an hour.

A DISTRIBUTION department has recently been added to the commercial department of the General Electric Company to take charge of the finished stock of all products exclusive of those of the incandescent lamp, electric refrigeration, merchandise, and plastics departments. This new division will be headed by J. V. Anthony, formerly connected with the San Francisco office, as manager, and Hancock Griffin, former supervisor of district stocks and warehouse, as assistant manager. In addition to the handling, warehousing, shipping, and billing of finished stocks, both at the various works and at the sales warehouses, the distribution department also has the function of studying methods and inaugurating changes in procedure.

GEORGE H. BUCHER has been elected vice president and general manager of Westinghouse Electric International Company, it was announced recently. On April 1, 1920, Mr. Bucher was appointed assistant to general manager of the company, and on July 1 of the following year he became assistant general manager, which position he held until his recent appointment.

THE Switlik Parachute & Equipment Company, Trenton, N. J., has been awarded a contract by the Navy for 400 twenty-four foot standard type white silk parachutes. This company is at present engaged in the completion of an Army Air Corps contract for 1,283 chutes. Re-

cently the Switlik concern completed a Navy contract for 200 twenty-four foot white silk Switlik Safety Chutes.

COLAS ROADS, INC., has been merged into Shell Eastern Petroleum Products, Inc., Asphalt Division, 1723 Chanin Building, New York City.

JOHN McHUGH STUART, New York newspaperman and foreign correspondent, has joined the staff of Erwin, Wasey & Company, advertising agency, in the Graybar Building, New York. Mr. Stuart formerly was on the news staffs of the New York Sun, Herald and American and before that served as correspondent in Washington, D. C., Paris and London for the International News Service and the Munsey papers. More recently he has been identified with aviation as director of publicity for Roosevelt Field, for the Fokker Aircraft and the General Aviation Corporations.

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## SOUTHEAST

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JANUARY PASSENGER traffic to date on American Airways' southern division planes, Atlanta to Los Angeles, not only exceeds that for any previous January period since operation of the line started in 1930, but it also indicates a 1932 popularity for plane travel that will set new records throughout the year, according to C. R. Smith, executive vice president of the company and general manager of the southern division. Mr. Smith added that transport aviation generally appeared to be facing the most successful year in its history in every phase of the industry.

A NEW administration building at Candler Field, Atlanta, Ga., will be ready for its official opening on or about April 1, it has been announced. The Atlanta Junior Chamber of Commerce was largely responsible for the erection of the building, which places the field as the third in rank in the country.

DESIGNED TO improve the weather reporting service for aviators in the Baltimore area, the Weather Bureau has assigned William Boettinger to the new post of weather observer at Logan Field, the temporary municipal airport of Baltimore, Md.

W. P. MARTIN has been appointed dispatcher at Logan Field, the Baltimore, Md., headquarters of Eastern Air Transport. Mr. Martin has been transferred to Baltimore from Hoover Field, Washington, D. C., to fill the vacancy created by the promotion of G. B. Matthews, the former dispatcher. Mr. Matthews is now field manager at Hoover Field.

THE B/J Aircraft Corporation of Baltimore, Md., has acquired control of the license for the Zap flap mechanism through its holding company, North American Aviation, according to an announcement of Temple N. Joyce, vice president and general manager of the B/J concern. The B/J organization has an experimental Zap plane at its plant, and it has been undergoing tests at Logan Field under the direction of the engineers and staff of the B/J company. The Zap plane at the B/J plant differs from other flap jobs, in that the trailing edge of the wing is split, the lower part only being lowered to give the flap effect, while the ailerons, instead of being floating, as in the Guggenheim safety plane, are mounted above the wing. The action of the flap is said to give the plane unusual aileron control at low speeds.

It was announced by Mr. Joyce that a Zap flap will shortly be installed on one of the commercial planes of the Eastern Air Transport and also on a military ship to test in actual service the low landing and air speeds which it makes possible.

THE Afro-American Aircraft Corporation, of Baltimore, Md., has been granted a charter in Maryland for the purpose of conducting a school of aeronautics. The organizers are William H. Young, Truly Hatchett and William S. Hays. Headquarters of the new concern are in the Vickers Building, Baltimore, Md.

LARRY HARRIS, Candler Field pilot, recently saved three lives by swooping over a burning residence occupied by Mr. and Mrs. W. H. Jones and six-year-old son in East Point, Ga., and with roaring engine awakening them just before the roof fell in.

EXECUTIVE OFFICES of the newly organized Latin American Airways, which will operate from California along the West Coast of Mexico, have been opened at 1004 Olympia Building, Miami, Fla. M. G. Tancred is president of the concern, Ernest Houston is treasurer and legal adviser, and Capt. J. F. Lancaster is chief pilot.

MORE THAN 1,400 lessons in flying and practice flights have been given by the Miami Aero Club since its organization three years ago. A total of \$13,000 has been spent for four airplanes, flying and in the promotion of aviation. Arthur E. Curtis is president. Igor Sikorsky, Lieut. James H. Doolittle, Capt. Lewis A. Yancey and Thomas B. Doe are among new members received recently.

THE U. S. COAST GUARD at

Miami, Fla., will receive in September two of the five flying boats that are being constructed for the Government. Each of the ships weighs more than five and a half tons and can carry several persons besides the crew. The seaplanes will have a cruising range of 1,000 miles, and will cost \$73,000 each.

THE TAMPA AERO CLUB has opened its ground school at Tampa, Fla. Instruction in airplane engines is by E. P. McGeachey; navigation and meteorology, by Frank M. Say. A series of lectures by Harry D. Denegre, manager of the municipal airport, is scheduled.

THE FLORIDA AVIATION ASSOCIATION has elected the following committee to rush construction on emergency landing fields in the state, with a fund of \$25,000 available each year: Fred Blair, St. Petersburg; George W. McCrory, Sanford; Ed. R. Bentley, Lakeland; L. W. Servier, Miami; C. L. Waller, Tallahassee; Franklin Wheeler, Fort Myers; Major A. B. McMullen, Tampa, and M. R. Hagler, Pensacola.

State Road Department officials are surveying Pensacola and other points in Western Florida for data on which the department will base its work of constructing intermediate emergency landing fields for airplanes throughout the state. The work was authorized by the 1931 Legislature, and the survey was begun recently with an air tour covering most of the state.

PAN-AMERICAN AIRWAYS, Inc., have announced a 152 per cent increase in passenger traffic between Miami and Havana for the month ending January 22 over the same month a year ago. Two Pan-American clipper seaplanes, put into passenger service December 22, carried 1,358 passengers up to January 22, while 538 passengers were carried in the same period a year ago.

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## NORTH CENTRAL

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THE COST of the development of the new municipal airport at Des Moines, Iowa, has been set by the city engineer at \$258,800. The amount to be spent on the field this year, providing the \$45,000 remainder of the \$200,000 bond issue is sold, will reach \$172,800. Cost of the land, which is \$80,000, and approximately \$3,000 available in the airport fund are included in the 1932 expenditure.

The 1932 output of money will take care of all grading, estimated to cost \$27,800, and half of the drainage system, \$20,000. The sewage treatment system and water supply can be put in readiness for \$5,000, and the plan is to complete both this summer. The moving of the

hangar from the old airport, together with the lighting system and installation of both at the new site, will cost \$20,000, and runway surfaces are planned at an expense of \$30,000.

A SINGLE-PASSENGER, high speed sport airplane is being constructed by N. M. Rowinski for Oscar Schmidt in the shop of the Milwaukee Parts Corp., Milwaukee. The plane is being built around an eight-cylinder, V-type air-cooled Tank engine made by the corporation. The plane's span is twenty-four feet six inches; its length, nineteen feet six inches. The fuselage is of chrome molybdenum steel tubing. Built according to military standards, the plane has a gross weight slightly in excess of 1,000 pounds. When test flights are completed, production on others ships will start. F. C. and A. J. Tank are officials of the Milwaukee Parts Corporation.

JAMES H. KIMBERLY, Neenah, Wis., was elected head of the Valley Aeronautical Society at its annual meeting. John Rossey, Appleton, was named first vice president; William Palmer, Neenah, second vice president, and Karl Greunke, Appleton, secretary-treasurer. The society was organized three years ago to foster aviation and for professional and technical advancement of members, who are largely transport or amateur plane pilots.

BUSINESS men of Peoria, Ill., are considering ways and means to finance an airport. Plans for raising the necessary funds are being discussed and options taken on eligible sites. A committee of ten has been appointed to take the necessary action.

AT A MEETING of the board of directors of the Galesburg, Ill. Airport Corporation, officers were elected for the coming year as follows: President, Julian Mack; vice president, H. T. Custer; secretary, J. W. Peterson; treasurer, W. E. Simpson. An effort is being made to promote air mail service for Galesburg, but this cannot be arranged until the present routes are revised. A public hangar will be a project as soon as the necessary financing can be arranged. The present private structure has room for one more machine and may be utilized by transients when necessary.

ARTICLES OF incorporation have been issued for the Decatur, Illinois, Airport Company. The new officers of the company were announced as follows: President, T. G. Wells; vice president, Brice Martin; secretary, Royal McClelland; treasurer, Charles Ruedi; directors, T. G. Wells, Brice Martin, Charles Ruedi, Adolph Mueller and Paul Temple. Capital stock was fixed at \$25,000, one-half of which was subscribed. An option has been secured on the land northwest of Decatur for a field. The land will be

improved and a steel hangar will be completed by early summer. The Century Air Lines will land six planes daily when the field is ready, and this number may be increased as additional routes are authorized. The American Airways Company has also agreed to land its planes in Decatur, picking up air mail at least twice daily. The stockholders plan additional improvements to the grounds as soon as it is felt that traffic justifies them.

CHICAGO NOW has direct mail service to 160 cities in 42 states and indirectly through connecting lines to 194 cities, according to figures compiled by United Air Lines. Because of the rapid expansion of air mail and passenger network, almost any point in the United States can be reached in one day or less from Chicago.

A NEW type 525-horsepower Hornet engine fed by direct injection, installed in a Boeing mail passenger plane, has passed one month's satisfactory tests, according to United Air Lines. It was used on the Chicago-San Francisco lines under all operating conditions.

ALL STUDENTS, either solo or with an instructor, have been forbidden to use the Chicago Municipal Airport. A clause in the airport's new state license prohibits use of the port by non-licensed fliers.

CENTURY AIR LINES have opened the initial unit of air-parcel-express systems between Chicago and Cincinnati. Century will be inaugurating similar service in all directions from Chicago in the near future.

THE HOTEL SCOTT AVIATION BEACON, erected on the roof of the Hotel Scott, at Hancock, Mich., was placed in operation about a month ago. This is the first aviation beacon in the Upper Peninsula of Michigan and is licensed by the Department of Commerce. The rotating beacon revolves twice a minute with 9,000,000 candlepower and can be seen at a distance of 100 miles. During the summer months the power of the beacon will be increased to 14,000,000 candlepower. A directional beacon of 3,000,000 candlepower, mounted on the same tower, will be focused on the new Hancock City Airport, which is rapidly being completed and is located one mile northwest of the hotel. This beacon installation was donated by Lieut. Harold J. Skelly, manager of the hotel. A directional arrow, painted on the roof of the hotel, will indicate the Hancock Airport during the daytime.

MURRAY R. BOESS and C. L. Clabaugh have organized the North Shore Airways, Waukegan, Ill., to teach flying, to make passenger flights, and to sell airplanes. Equipment includes a

Travel Air Sport Trainer, a Curtiss-Wright Junior, and the use of a Locomotiv Stinson Junior. The operations office is located at Waukegan Airport.

## SOUTH CENTRAL

THE ANNUAL report of operations for 1931 at the Kansas City, Mo., Municipal Airport made by Roy C. Farrell, airport manager, shows an increase of more than 300 per cent in the amount of air mail transported there over the poundage carried in 1930. There are now forty-two scheduled arrivals and departures of aircraft daily, fifteen of which are between the hours of 6:00 p.m. and 7:00 a.m. The total number of passengers transported was 34,056. Gasoline sales rose to 647,667 gallons, an increase of 102,000 gallons. There were 3,169 landings by privately owned aircraft, which carried a total of 2,279 passengers.

Improvements at the Kansas City Municipal Airport include completion of a radio beacon and the removal of light and telephone wires at the east end of the new east-west runway. The radio beacon, which is now in operation at the north end of the airport, is of the aural type but will be eventually changed to the visual type. The new airport and post office building at the Kansas City Airport is also completed. Constructed by the city at a cost of \$20,000, it houses the post office on the ground floor and the weather bureau on the second floor. The post office is prepared to handle twenty tons of air mail daily. Re-routing of air mail between New York and Los Angeles through Kansas City instead of Chicago has more than doubled the amount of air mail handled daily at Kansas City, two tons being the average daily poundage carried by ships of Transcontinental and Western Air alone.

A group of airlines in operation at Kansas City, Mo., have formed an association to facilitate handling ticket sales and dispensing airline information at the Kansas City Municipal Airport. The new organization, known as the Air Line Information and Ticket Bureau, with quarters in the administration building, represents the following lines: Transcontinental and Western Air, United Air Lines, Rapid Air Transport, American Airways, and United States Airways. The Bureau is managed by Thomas C. Mitchell, Jr., formerly with N.A.T., assisted by Hugh Coburn as assistant manager.

KANSAS CITY was recently made headquarters of the newly created central traffic division of United Air Lines, taking in a territory that extends from the Canadian border to Mexico and from the Mississippi West to New Mexico and Utah. The new division is expected to

facilitate handling of traffic on the Southwestern part of the system. A. G. Kinsman, stationed for three years at Cheyenne with the Boeing division of United Air Lines, is now traffic manager at Kansas City. The Kansas City territory has previously been under the supervision of the Eastern division headquarters.

**IMPROVEMENTS** costing \$80,000 at the Omaha, Neb., municipal airport are planned this year by Commissioner Dean Noyes. A northeast-southwest runway will be constructed, and the tract of ground recently acquired on the north will be drained, filled and cleared. The weather bureau at the field will be one of the most complete in the country, it was stated.

**AN ORDINANCE** permitting all operators and oil companies to sell gasoline and oil at Love Field, Dallas, Tex., and raising the gas fee from one to three cents a gallon, has been placed before the city council of Dallas for action.

Under the ordinance pilots with limited commercial as well as transport licenses will be permitted to carry persons for hire from the field. No provision is made for take-off, landing and taxing rules, empowering Airport Director Preston Sneed to promulgate such rules.

The higher fees on gas are expected to raise the city's annual income from the port from \$8,000 to \$12,000, a sufficient amount to pay maintenance and operating expenses.

**DALLAS, TEX.**, employees of American Airways during 1931 received \$135,000 more in salaries than during 1930, according to the annual report of the company. The 1931 pay roll amounted to \$538,319 in Dallas, while the total for the division, including offices and service stations in eight states, was \$905,319. Increases in the number of men employed in the airplane overhaul shop at Dallas were responsible principally for the larger pay roll. In addition, more than \$400,000 was paid out for fuels, supplies and materials delivered to various points of the division.

**McALLEN-HIDALGO** municipal airport at McAllen, Texas, has been formally opened. The 200-acre field is equipped with two steel hangars, a 1,500-foot hard-surface runway, a caliche tarmac and a fuel station.

**THE Oklahoma City Airlines Ticket Office** association was formed February 3 and officers elected at a meeting of executives of five airlines operating through Oklahoma City. Function of the association is to operate a consolidated ticket office at the new Oklahoma City municipal air terminal. Operators also decided on division of costs and rules under which the office will be operated

but did not select personnel of the office. Officers named included: A. L. Everett, United Air Lines, president; Joe Reed, Reed Airlines, vice-president; C. S. Fullerton, Transcontinental and Western Air, Inc., secretary and treasurer. Directors are: Temple Bowen, Bowen Airlines; Paul Braniff, Braniff Airlines; Joe Pitts, Reed Airlines; William Larner, Transcontinental and Western Air, and J. R. Green, United.

**FORMAL DEDICATION** of the Tulsa, Okla., municipal airport, to be held March 24, is expected to attract aeronautic officials and airport experts from aviation centers of the country. Completion of the administration building in December brought the total investment in the Tulsa port to more than \$3,000,000. Improvements include two asphalt runways, one 100 feet wide and 1,600 long, available for either north or south take-off.

**BEFORE THE** close of 1932, the Curtiss-Wright port at Oklahoma City is expected to go into service as a divisional branch, with demonstrators of all kinds from the company's various factories located there.

Service and parts operations over the Southwest also will be given from this port. The flying school has been re-established, with Aubrey Keif, former member of the British Royal Flying Corps, appointed as supervisor. Classes in ground work fundamentals in aeronautics are being organized at Central High School, with John H. Burk of the Curtiss-Wright Company as class director.

**A NEW** one-kilometer and three-kilometer air race course have been established at Lambert-St. Louis Municipal Airport, St. Louis, Mo. The new courses were laid out under the direction of George M. Parker, who said they will be available for the holding of official speed tests in the district. They will supplement the fifty-kilometer course established there during the 1923 Pulitzer Air trophy races, which have just been re-marked.

**A PHOTOGRAPHIC** aerial survey of 5,000 square miles of the state of Louisiana is to be made for the United States Bureau of Geological Survey by an officer and two enlisted men from Scott Field. Herman F. Woolard will be in charge of the work. He will be accompanied by Corp. Paul Langlands and Sergeant William F. Rhodes, who will serve as photographer.

**THE FORT WORTH** offices of the International-Stacey Corporation and those of its subsidiary companies, International Derrick & Equipment Company, Roots - Connersville - Wilbraham, Stacey Brothers Gas Construction Company and Stacey Manufacturing Company, were

moved February 14 to Room 307, Southland Life Insurance Company, Dallas, Texas. F. W. Mohler, midcontinent sales manager, and C. B. Coldwell, sales engineer for the Stacey and Roots-Connersville-Wilbraham divisions, and S. B. Creamer, sales engineer for Ideco, are located in the Dallas office.

**A UNIFORM** aviation code, to be recommended by the American Bar Association for adoption by the states and Federal Government, was drawn up by members of the Aeronautical Law Committee of the association and the Aviation Committee of the Commissioners on Uniform State Laws, who held a two-day joint meeting last month in St. Louis, Mo. The code will be submitted to the association at its annual convention in Washington, D. C., next fall, and if accepted by that organization, an attempt will be made to persuade the states to amend their aviation laws to conform to the proposed code, it was stated.

**W. D. MORRISON** and Edward Sisson, oil well drillers and operators, have been appointed as distributors for Nicholas-Beazley Airplane Co., Inc., in Southern Texas, with headquarters at San Antonio and Rio Grande City. A new distributorship company will be formed, to be known as the Texas NB Aircraft sales. The services of Nicholas-Beazley's chief pilot, Dwight S. "Barney" Zimmerley, have been lent to assist in the formation of the new company. The territory covered by the agency incorporates all of Southern Texas, west of the Brazos River and south of Waco, with its western boundary lying parallel with the western border of Valverde County.

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## NORTHWEST

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**NORTH CENTRAL** Washington is renewing its efforts to have an airplane port of entry established on the Canadian boundary near Oroville to accommodate north-south air traffic over the state's inland route. The need of such a station was emphasized the first of last month by the two-day delay of William Graham and his co-pilot, Mrs. Edna Christoffer-son, American fliers who were planning to search for the abandoned fur ship adrift in the Arctic Ocean. Although cleared without difficulties by the American Customs, they had to receive permission from Ottawa, since the Canadian offices near Oroville have no authority to clear planes.

Because difficulties have been encountered on several previous flights across the border at Oroville, and because of the increasing use of this inland route, Congressman Hill and Senator Dill were asked to use their influence for effecting

a mutual agreement between Canada and the United States for clearing air traffic at this point.

NEW officers of the Portland, Ore., chapter of the Women's National Aeronautical Association are: Mrs. Alice Watts, president; Miss Dorothy Hester, vice president, and Miss Pauline Bondurant, secretary.

The chapter has cooperated with the Portland Aero Club in entertaining visiting fliers, has sponsored receptions for Portland women fliers, and has participated in such events as the Rose Festival air meet and Northwest air tour. The chapter's objectives include the dissemination of information regarding aviation development, promoting air mail use, supporting schools and general education in aeronautics, promoting plane model contests for boys and girls, popularizing air travel, aiding in the establishment of airports and landing fields, encouraging the painting of city names on buildings for the guidance of aviators, and obtaining local cooperation with the Aeronautics Branch of the Department of Commerce.

OREGON had a total of 169 planes, twelve gliders, 212 pilots and 107 mechanics on January 1, according to a bulletin of the Aeronautics Branch, Department of Commerce. The list shows ninety-one planes to be licensed. Of the pilots, sixty-five hold transport licenses, sixteen have limited commercial licenses, and 131 have private licenses.

PLANNING a most active year in aviation in 1932, the Tacoma, Wash., Chamber of Commerce has selected C. W. Drow to head its new aeronautics committee.

THE ALASKA Aerial Trading Company was recently formed and incorporated at Seattle, with capitalization of \$5,000. Incorporators are Lief C. Buschmann and Edward M. Haye. Purposes of the company are to deal in furs as well as other merchandise and to own and operate airplanes in Alaska.

DARWIN MEISNEST has been selected as the chairman, and W. W. Conner, vice chairman, of the new aviation committee of the Seattle, Wash., Chamber of Commerce.

A SURVEY of air traffic on the Seattle-Chicago-New York airway of United Air Lines during the past month shows that air express increased more sharply than other phases of air transportation. Transportation of express shipments from Seattle East by mail-passenger plane was 37 per cent greater in January than during December, 1931. Company officials pointed out that the increase is significant because of the numerous Christmas packages shipped by air during December and attributed

the sharp growth of air express to the marked reduction of rates effective January 1. The cut, from 50 to 75 per cent, resulted in unprecedented loads of packages. Introduction of new regulations allowing transportation of packages weighing up to 200 pounds has widened the field of air express, officials said.

The number of women using air passenger service on the Pacific Coast is substantially growing, according to records for 1931 travel, which show that during the year 30 per cent of all air travelers were feminine. The local traffic office of United Air Lines reported that during last month 33 per cent of passengers flying from Seattle to California cities were women.

FIGHTING forest fires by airplanes in thickly wooded districts has proved effective. Statistics compiled on forest fires among the tall timbered regions of Washington for the year 1931 show a decided drop in the number and extent, loss and damage, during the year, which has been attributed to the excellent work of airplane patrol and transport of fire fighters to the scenes of conflagration before the fires were beyond control.

SEATTLE'S municipal airport is to undergo improvements, including repairing and resurfacing of the runways. About \$20,000 will be spent on new activity. Additional water pipes and resources are also being considered to minimize fire risk and hazard to the growing group of airplane property at the port.

AIRPLANES are a great success in helping to count elk on the ranges of Idaho, according to Orange Olsen, in charge of the fish and game division of the U. S. Forest Service, who recently experimented in the work in the Jackson Hole country, Wyoming. The forest officer related that a plane piloted by Vern Carter, of the Utah Pacific Airways of Ogden, was used in the experimental work. Airplanes are also being used by ranchers to help locate lost sheep herds.

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## SOUTHWEST

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A CHECKUP of operations at Oakland, Calif., Municipal airport during January shows 6,259 landings and 1,882 passengers carried. Of the total number of landings, 4,271 were made by student planes. On the last day of the month 379 students were taking training at the field.

CAPT. O. C. LE BOUTILLIER and Lieut. Earl Gordon, two fliers with World War flying honors, have organized "Pacific Coast Skywriters" at United Airport, Burbank, Calif.

THE extension department of the

Boeing School has been unusually busy recently, having received a number of invitations to speak before high school assemblies and vocational guidance groups. A check shows that 8,684 prospective students and parents were addressed in these meetings during the month of January.

THE University of California hockey team traveled by airplane when it went South to play the University of Southern California team. Players, managers, coach and equipment were transported in three special Varney Speed Lines planes.

MISS PANSY BOWEN, Federal weather observer at Visalia, Calif., has been appointed lieutenant-commander of the Ninth Corps Area, Betsy Ross Corps. She will have jurisdiction over California, Oregon, Washington, Nevada, Utah, Idaho, Montana, and Wyoming.

SINKING of test piles to furnish data for construction work is under way at Benton Field, Alameda, Calif., the Army Air Corps supply depot and repair base for the Western states and the island possessions. Construction of a 200,000-gallon water tank is scheduled to start early in February. The contract was awarded to the Huber Construction Company of Los Angeles on a bid of \$16,780.

WINFIELD HALE, San Francisco bay region sportsman, took off January 29 on the first leg of a 15,000-mile air tour of Central and South America. He is making the tour in his Monocoupe plane, flying alone.

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## TRADE LITERATURE

### *New Pamphlets and Books of Interest to the Aeronautical Industry*

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#### *Post Office Circular*

A CIRCULAR containing all up-to-date, essential information of the air mail routes in operation was published by the New York Post Office under date of January 18. Postage regulations, time tables for air mail routes, lines by which mail from various parts of the country are routed, and approximate time that air mail is due at destinations, listed by states, are covered by the folder. In a separate leaflet published by the post office under the same date, the U. S. air mail service to Central and South America, West Indies, and Mexico is discussed. Information contained in this folder includes mail carried and postage, endorsements, and time tables for each country, showing the closing time for departure, rates of postage, scheduled time of arrival at destination, and time spent in transit.

### Aviation Insurance News

WITH the February issue, "Lift," a new bulletin of aviation insurance news and comments, made its appearance. Published by Aviation Protection, Inc., 110 William Street, New York City, the leaflet features an hourly weather-flash service announcement, describing a system whereby conditions over Eastern air routes will be telephoned by the company, upon request, to local persons. The weather reports, received by Aviation Protection, Inc., direct from Station WWU, Department of Commerce, New Brunswick, N. J., are given out as follows: New York-Boston, on the hour; New York-Pittsburgh, ten minutes after each hour; New York-Cleveland, thirty minutes after; New York-Washington, forty-five minutes after; New York-Montreal, fifty minutes after.

### Engineering Achievements

OUTSTANDING technical accomplishments of the past year are reviewed in a forty-page booklet, "Engineering Achievements, 1931," published by Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pa. Of special interest to the field of aviation are the description of the electrical equipment of the Navy dirigible, *Akron*, and the exposition of the construction and use of the seaplane towing channel at Langley Field, Va., both of which appear under the heading of "Transportation." In the "Radio" section are interesting discussions of the *Akron's* radio set, the first portable radio beacon, and radio for commercial planes.

### Bulletin on Metal Alloy

PROPERTIES and advantages of chrome-vanadium nitriding steel are described in Technical Bulletin No. CV-1 issued by Electro Metallurgical Company, 205 East 42nd Street, New York City. The booklet also contains recommendations regarding heat treatment and specific instructions for the method of nitriding. It is illustrated with pictures of nitrided steel cases.

## NEW AERONAUTICAL BOOKS

### THE RED JUGGERNAUT

By LUCIA RAMSEY MAXWELL

A STARTLING revelation of Communism and its menace to world peace and to the safety of America, this book is a challenge to every thoughtful reader. Every member of the defense forces of the nation, as well as industrial executives, patriotic organizations and law makers should know the facts contained in the volume.

The insidious spread of Communistic propaganda, the determination to promote the new social order by means "peaceful if possible, bloody if necessary," Communistic plans for aircraft and chemical warfare, the work of Soviet agents attempting to secure U. S. Army secrets, Russia's Five Year Plan seen as a gigantic undertaking especially constructed for war requirements—all are discussed and explained in "The Red Juggernaut," which is supported by documentary facts.

The book points out the threatening aspect of international conditions and the indications of trouble within the United States and warns of the folly of attempting disarmament at a time when the nation is in peril from forces without and within. The chemical industry characterized by a chemist as the "supreme war industry," aircraft workers pledged to fight aggressively against war and the capitalistic system, the rallying cry, "Sabotage and Destruction of Armies"; preparations of the major nations for gas and bacteriological war—these are a few "Red Juggernaut" straws that show which way the wind is blowing in international affairs.

### WINGS FOR MEN

By FRANK WEAD

TRACING the history of flying from the days of ancient mythology to modern times, the author relates a vivid, in-

teresting story of aviation that is sometimes amusing, sometimes tragic, but always inspiring.

Numerous attempts were made to fly in accordance with the wing-flapping idea, yet the hot-air balloon was the first spectacular success of aviation. Considerable space in the book is devoted to these early balloons and their lighter-than-air successors.

The invention of the glider, about 1796, is described at length, as well as other notable occurrences, such as the first battle in the air, carried on between enemy balloons in the Franco-Prussian War.

Then follows an account of the discouraging but plucky struggle to invent a heavier-than-air flying craft. The experiences of the principal experimenters and many less well known are related.

The accomplishments of the more recent years are described in the last four chapters. The volume is liberally illustrated with drawings of the pioneer inventions and photographs of later developments.

### STANDARD AIRPOST CATALOGUE

Edited by E. H. WILSON and S. H. FALKOFF

TWO new features are incorporated in the 1931 edition of this book. One is the listing of airpost stamps in complete sets, and the other is the listing of airpost stamps used on first day of issue covers, or stamps flown and postmarked on the first date of issue.

The main part of the catalogue lists both official and semi-official air mail stamps according to countries, naming first the stamps of the regular issue, followed by those carried on first and special flights. Of special interest is a history of balloon air mail delivery, as it was carried on during the Franco-Prussian War.

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Consulting Aeronautical Engineer

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# FOREIGN NEWS IN BRIEF

Compiled from correspondents' reports and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

## CANADA

CANADIAN AIR MAIL was used more in 1931 than in any other year since operations began, according to the preliminary annual report of the Civil Aviation Branch of the Department of National Defense. The report shows that 483,490 pounds of mail matter were flown during 1931, as compared with 474,199 pounds in 1930. This total was reached despite the fact that four services were discontinued during the year and three routes were shortened, as economy measures of the government. There were fifteen routes in operation at the end of 1931.

Air harbors have shown an increase during the past year, and there is a total of seventy-eight licensed. More than seventy new planes were licensed during the year, giving a total of 495 aircraft registered. The number of private, commercial and air engineer certificates in force at the end of 1931 was: 292 private, 366 commercial and 346 air engineer. Accidents for the year showed a decrease.

Government-sponsored flying clubs in 1931 flew 11,958 hours, and their membership showed a total of 2,973 enrolled. Sixty-five planes were in use by the clubs. The Edmonton club led in flying time, with 1,290 hours, followed by Toronto and Montreal.

H. H. RICHARDS of Fort William, Ont., was elected president of the Canadian Flying Clubs Association at the third annual meeting of the association in Winnipeg, Manitoba. He succeeds J. A. Sully of Winnipeg. Other officers include: Vice-presidents, R. J. R. Nelson, Halifax, N. S.; A. H. Keith Russell, Toronto, Ont.; H. P. Crabb, Winnipeg; treasurer, M. A. Seymour, St. Catha-

rines, Ont.; executive secretary, George M. Ross, Ottawa, Ontario. Seventeen of the twenty-two member units were present at the meeting.

MISS DAPHNE PATERSON of the Saint John (N. B.) Flying Club is the winner of a cup presented by the De-Havilland Corporation of Canada for general proficiency in flying. This is one of the trophies given by the company for the encouragement of Canadian aviation. Competitors from all the maritime clubs took part in the contest, which was held in Moncton.

THE TORONTO-DETROIT air mail service now is being flown both ways at night, greatly increasing its efficiency and usefulness. The Post Office is conducting a campaign to increase use of this service. Canadian Airways, the contractors, are using Wasp-powered Stearman on this route and lighting equipment has just been installed at the Toronto terminal. The company is reported to have ordered several ten-place cabin ships for use in passenger services across Canada, beginning next spring.

AN ALL-METAL Junkers 52 has been delivered to Canadian Airways Limited and will be used this winter in carrying heavy freight along the Arctic coast, with King William Island and Boothia Peninsula, close to the North Magnetic Pole, as the chief destination. The plane is the first of a line which the company expects to operate in the Northwest Territories.

A SILVER cup to be known as the MacLaren Airmanship Trophy has been presented to the Saint John Flying Club by D. L. MacLaren, an associate member of the club.

## AUSTRALIA

AIR TRAVEL along the Australian northwest coast has become so popular that W.A. Airways, Ltd., have acquired another D.H. 61 eight-passenger plane to accommodate increased traffic.

THE AIRPLANE as a flood relief agency was demonstrated during recent flood conditions in Western Queensland. Planes of Q.A.N.T.A.S., Ltd., were employed to transport people out of the flooded area and to bring food and medical supplies to stranded campers. Despite boggy airports and rainy weather, only minor delays of the service were reported.

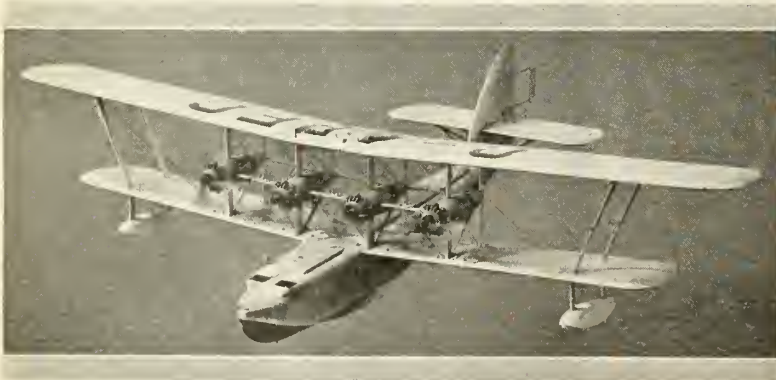
BERT HINKLER, the Australian flier, who flew recently from New York to London by way of Jamaica, Brazil and West Africa, is planning a tour of the United States by automobile. He was awarded the Britannia Trophy by the Royal Aero Club for the year's most meritorious flying performance.

IT IS POSSIBLE to hire an airplane to go anywhere in New South Wales for only one shilling a mile for a single passenger, or one shilling and three pence for two passengers, a rate that is equal to or less than the prevailing car rates.

NEW ENGLAND Airways have inaugurated a regular mail and passenger service between Brisbane and Sydney, using a Puss Moth, a Ryan, and a Fokker. The Ryan, now the *City of Lismore*, used to be the *City of Sydney* and is the plane with which Dave Smith and Wally Shiers attempted an Australia-to-England record.

## CHINA

HOSTILITIES between Japanese and Chinese forces at Shanghai have brought forward again the importance of aviation in modern combat. Japan used a well-equipped fleet of airplanes as a principal part of her attacking campaign to bomb the Chinese forces. China, on the other hand, was reported to be attempting to assemble 130 planes delivered to the Chinese air force twelve years ago from England but which had never been unpacked because of the disorganized condition of the government. Negotiations have been made by Chinese officials, it is said, to seek Air Commodore Charles E. Kingsford-Smith, Australian flier, as commander-in-chief of the Chinese air



Short Kent flying boat with four engines, used by Imperial Airways

force. It is also reported that China sought the purchase of the Australian National Airways fleet.

## CUBA

AN AIR mail service was inaugurated February 15 by Compañía Nacional de Aviación Curtiss to Bayamo, Manzanillo and Guantánamo. The service is an extension of the previously established air mail and passenger route between Havana, Santiago and Baracoa. Stops at Tunas and Holguin have been discontinued.

AN INTERNATIONAL school of civil aviation has been established at Havana. The object of the school is the preparation of commercial pilots, with emphasis upon instruction concerning landing conditions and the formalities of international traffic.

## DENMARK

TRANSAMERICAN AIRLINES, an American organization, has received permission to use permanently two harbors in Greenland, one on the west and the other on the east coast, and to establish a base in the Faroe Islands for a repair depot.

## ENGLAND

BRITISH AIRLINERS have carried in the months of November and December, 1931, and January, 1932, twice as many passengers between London and Paris as in the corresponding period a year ago. The weather has been unusually good, and the airways have benefited from the fall of sterling exchange, which makes the air return journey between the two capitals considerably less expensive than the fare charged for boat and train travel.

The total number of miles flown by Imperial liners since April 1 last year stands, in the latest available figures, at 1,151,666 miles, compared with 1,007,358 miles in the previous corresponding period. Receipts are up £95,657 at £577,406, some of this increase being represented by subsidy payments in connection with the working of the African route.

DEVELOPMENT of a special class of airplane for use in urgent transport work "behind the lines" of the kind hitherto performed exclusively by motor lorries is the object of Royal Air Force tests of a new air freighter, designed with the idea of providing an efficient and roomy vehicle for the carriage of urgently needed stores.

The craft supplied to the Air Ministry is a Vickers "Vellore" twin-engined biplane, having a luggage cabin large enough to accommodate two powerful engines and the essential spare parts, several wounded men, food sufficient to



The Breguet, flown 6,800 miles by the French fliers, Codos and Robida

sustain a company of soldiers for many days, or fourteen fully equipped infantrymen, according to the emergency. A sister machine built on slightly modified lines and called the "Vellox" is equally efficient as a load carrier and is able to reach the high maximum speed of 150 miles an hour at a height of 5,000 feet.

THE AIR MINISTRY has decided to order a mail airplane designed for a cruising speed of more than 150 miles an hour. Specifications require that two pilots, a load of 1,000 pounds of mail and fuel for 1,000 miles non-stop must be carried, and provision made for elaborate navigational equipment suitable for night and day flying. The new craft is expected to attain a maximum speed of 200 miles per hour. The big increase in the use of air mail services during 1931 indicates steady growth of public confidence in the airplane. Altogether 52.4 tons of letters were carried by air out of England, an increase of 29 per cent over the figure for 1930 and of 74 per cent over 1929.

A DISTANCE of 347,300 miles, or nearly fourteen times around the world, represents the total distance covered in a few months by Armstrong Siddeley 215-horsepower "Lynx" engines fitted to monoplane airliners which were added last year to the Imperial Airways fleet. This mileage was covered without a single involuntary stop, late departure or cancelled service, and engines of this kind are now flown no less than 600 hours between overhauls.

A FASTER and more direct winter air route to India, and a mid-weekly air mail to Africa have been put into operation by Imperial Airways, and Empire air fares have been reduced.

A LARGE number of Vickers "Vildebeest" torpedo-bombers are to be built under license at Cadiz for the Spanish Naval Air Service.

## FRANCE

TWO FRENCH aviators, Paul Codos and Henri Robida, recently accomplished a record-breaking flight from Hanoi, French Indo-China, to Paris, a distance of 11,000 kilometers, in three days, four hours and ten minutes. They eclipsed a previous record time of four days, twelve hours, made by Costes and Bellonte.

Codos and Robida accomplished their flight in a Bréguet 33 R. 2, sesqui-plane, a development of the Type 27 "Tout Acier," described in AERO DIGEST of July, 1929, and September, 1930. The Bréguet 33 R. 2 is slightly augmented in length and is fitted with the 650-horsepower Hispano-Suiza motor instead of the 500-horsepower engine. With its fuel capacity of 1,800 liters, it has a range of 2,700 kilometers or fifteen hours of flight at 180 kilometers per hour cruising speed. A structural feature is its narrow tail section, which is in the form of a beam after the cockpits.

WITH the legalization of the Lafayette Escadrille Foundation, the perpetuating of the triumphal arch memorial to the pioneer U. S. fliers in the World War is assured. A recent gift of \$40,000 from Nelson Cromwell, an American lawyer, will secure indefinitely the maintenance of the memorial.

## GERMANY

A SUBSTANTIAL increase in both the number of passengers carried and the volume of freight transported was reported by three Berlin airports, Berlin-Tempelhof, Berlin-Staaken and Berlin-Johannisthal, for the first ten months of 1931, as compared with a corresponding period in 1930. The Johannisthal airport was recently added to the other two for operation by the Berlin Airport Company.

DR. HUGO ECKNER has announced that the Graf Zeppelin will make four trips to Pernambuco, Brazil, this spring.

Starts from Friedrichshafen are scheduled for March 20, April 3 and 17 and May 1, with landings at Pernambuco on March 22, April 5 and 19 and May 3.

TWO AIRPLANES weighing 570 and 770 pounds, respectively, and costing about \$700 were tested above Tempelhof Airport, Berlin, February 10. Built by amateur fliers to popularize flying, they were said to incorporate glider elements in their construction. Each was equipped with a twenty-horsepower Mercedes engine and had respective wingspreads of nine and ten meters.

THE LARGE Junkers plane, G.38, owned by the Luft Hansa, has been withdrawn from transport service and, in accordance with an agreement between the Luft Hansa and the builders, returned to the latter which will conduct a number of scientific tests during the next few months.

THE Focke-Wulf Flugzenbau and the Albatros Flugzeugwerke have now become amalgamated. The Focke-Wulf company has acquired control of the Berlin organization. Focke-Wulf, at Bremen, was founded in 1924 and was able to establish a good reputation with its transport planes, which were distinguished by their great stability in the air. The Albatros company has grown out of the Albatroswerke Company, founded as long ago as 1909. It did not succeed in establishing itself as a producer of transport planes after the war. For the last two years, however, Albatros has devoted itself to the construction of metal planes with fabric covering and the promising results obtained recently with large cargo machines appear to have induced the Focke-Wulf company to take an interest in the company so as to acquire the experience it has gained with metal machines.

### ITALY

A HUGE hangar, said to be the largest in Europe, has been built at the G. Miccolli airport at Venice. Ten portals, sliding on rails, close the entrance of the hangar, which is capable of accommodating ten large passenger planes.

A MERGER of two Italian aeronautical concerns of prominence, the Soc. Aerea Mediterranea (S.A.M.) and Transadriatica, has resulted in the formation of one of the largest Italian air transport companies. Gr. Uff. Umberto Klinger is president of the new company, which has its headquarters at Rome.

### JAPAN

THE "HOCHI-SHIMBUN" (the Hochi newspaper office) has announced that they will try three trans-Pacific flights in the spring. One will be flown by S. Yoshiwara with a light plane from America to Japan, with several landings on the North Pacific Ocean. Two aviators and one radio operator will make another flight in a Junkers W.33F airplane, flying from Sabishiro flying field to San Francisco in two stops. The third flight will be non-stop from America to Japan by two aviators.

A SUPER-BOMBER of a type similar to the G.38 of Germany was completed at the factory of Mitsubishi recently. It is an all-metal monoplane and has four Junkers type L.88, 840-horsepower engines. It has a flying speed of 225 kilometers per hour; endurance, eighteen hours; range, 3,124 kilometers; gross weight, twenty-four tons; crew of ten; wing span 120 feet; length overall 60 feet.

TWO AIRPLANES were recently constructed and transported to Manchuria

as a result of a 100,000-yen contribution to the Japanese army by the Japanese people. One airplane is a light bomber of the Junkers type, a four-seater, with two 480-horsepower engines, top speed of about 230 kilometers per hour and endurance of six hours. The other is an ambulance plane of Comet type, a six-seater, with a single 500-horsepower engine. The army ministry has announced that a new air corps of ten planes has been made possible through public contributions.

THE JAPAN Aerial Transportation Co., Ltd., has been contemplating extending its airline from Dairen to Mukden and Tsitsihar, since communication between Dairen and Mukden via the South Manchurian Railway has been interrupted because of the disturbance in Manchuria. It is planned to have another airline branching off from Keijo in Korea. Air mail and passenger service between Tokio and Dairen via Chosen has been maintained daily, except when prevented by weather conditions.

### RUSSIA

UMBERTO NOBILE, former general in the Italian army and commander of the *Italia*, is reported to have signed a contract to design and construct a series of dirigibles for the Soviet government. The period of the contract is for three or four years. He will be assisted by a group of Italian experts and will work in cooperation with the Soviet Aeronautical Institute. The agreement also provides for General Nobile's participation in a Soviet scientific expedition to the Arctic next summer.

THE SOVIET Board of Civil Aviation has announced that forty-seven new airlines will be inaugurated in 1932.

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## AIR—HOT AND OTHERWISE

(Continued from page 30)

some chance of making a fair showing.

A momentous change of policy is indicated, yet the reasons for it are not stated, nor is there any indication that any committee, or even sub-committee, passed a resolution authorizing such a change. Almost the only mention of our old friend "fundamentally," frequently referred to in previous reports, comes on page 8, in the statement: "Recognition by the Government of the necessity of satisfying the increasing demand for new and accurate knowledge on the fundamental problems of flight has made possible the development of the Langley Memorial Aeronautical Laboratory. . . ."

Congress, the report declares, expects fundamental research. It has been pointed out repeatedly in this magazine that the research work of the N. A. C. A. has not been of that character for many years. We never have been contradicted on this point. The report tacitly confesses this and indicates that the N. A. C. A. has thought proper to lower its standards, in spite of the wish of Congress and the nation as a whole for the higher, indeed for the very highest, ones.

We have indicated, now, all that this report says about the performance of that work for which the N. A. C. A. chiefly was created. That a large sum was spent in traveling expenses—\$15,000 for getting interested people together periodically—is not indicative of earnest effort to "direct and supervise and determine research problems." Research is done between travels by the strenuous effort of brilliant minds concentrated in the midst of prepared facilities.

One thing that the N. A. C. A. really should do is to make a genuine analysis, through competent experts, of each year's progress. Upon such analyses programs for the continuance of research could and should be based, discussion should be encouraged and all that is worth while developing therein should be made public, so that the entire industry might, if interested, have some sense of partnership in the endeavor to spend these large sums of public money for their benefit.

The N. A. C. A.'s own experimental research has been costly, but to what end? A large part of the \$1,488,000 appropriation, \$800,000, was spent for new equipment and about \$600,000 for current work. The new equipment consists of that celebrated wind tunnel (which so far has failed to function properly) and a towing basin.

So we are forced to admit that the main results of the N. A. C. A.'s experimental research for the year is laid down in 13 technical papers. Attributing the entire expenditure to them we find their cost to have been in excess of \$100,000 each. Deduct the funds for current work and we still have \$50,000 per paper. The world never has known more costly current literature than that. It makes a piker out of Rudyard Kipling, who stunned the publishers when he demanded, and got, twenty-five cents (that is, an English shilling) a word. The cost of four of these papers would constitute a nice endowment for permanent and continuous fundamental research work.

A detail of research may be worth \$50,000, or even more than that, but only if it be broad and deep along fundamental lines, opening new avenues of thought which

(Continued on following page)



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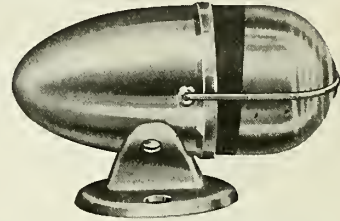


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After the writer had spent approximately four hours in the air testing the Fairchild 22 we decided it had possibilities and to give it a thorough test for student training.

We, therefore, took one of our students, John Edgar Hanson, who had two hours' time in a light plane, and took him up in the Fairchild, and after 15 minutes' instructions he soloed this plane, making a perfect three point landing.

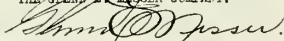
After the thorough test of this plane, and the experience with this student, we decided that the plane was particularly suited for the class of flying that the average person of today does.

The above experience is responsible for our having taken on the Fairchild line in this territory, and we congratulate you on producing a plane so inherently stable, safe and easy to fly.

We attach hereto affidavit certifying to the above mentioned student.

Yours very truly,

THE GLENN E. MESSER COMPANY.



GEM:SM

## A dealer tells why he chose the "22"

**B**ECAUSE the other fellow's experience always is interesting and often helpful, we reproduce the above letter written by a new FAIRCHILD dealer in the South. ¶ The reasons why this dealer—who "tried them all because he was interested in selling the safest and best all around airplane"—chose the FAIRCHILD 22 are significant. ¶ His decision was based purely on performance. When he soloed a student—one who had only two hours previous training—in fifteen minutes, he knew that the FAIRCHILD 22 was a seller. ¶ Such downright keen performance is a stimulus to the commercial operator and flying school. It is a spur to private ownership; an amplification of the FAIRCHILD creed—"Stamina to give unflinching performance under the most severe conditions." ¶ The price, too, is consistent with current values—\$2775 at the factory, with the 95 h.p. Cirrus Hi-Drive and complete equipment, ready to fly.

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(Continued from preceding page)

will lead to new knowledge and achievement. Research depends so greatly upon programs. Unless a program is guided into being by the greatest intellectual strength available, the best efforts of the most conscientious research engineer will be wasted on it, certainly unable to create a research paper worth \$50,000, not to mention twice that sum.

As a matter of fact the papers which have been produced are not extraordinary. Six of them cover ordinary routine force measurements on conventional airplane parts and have no scientific value. In none of them is any new effect announced or even searched for. Four papers give results of pressure distribution measurements, including tables and curves of thousands of readings without any attempt to apply these to an advancement of science. The two remaining papers compare two different and well-known types of supercharger blowers, finding no difference in their results. Another investigates a new injection valve. The last does not deal with any flight problem at all.

No opportunities are seized, and, as usual, many are missed. If the N. A. C. A. had devoted attention to the subject of turbulence before the giant wind tunnel was constructed, a paper on this subject might have been worth to the taxpayers and the industry far more than \$50,000, more even than \$100,000. Had this been done, our million-dollar tunnel would be a very different thing from that which it is today. For this wind tunnel the paper comes too late, and, to experts, contains nothing particularly new.

The list of researches for the Army and Navy contained in the report would impress us more if it contained fewer acquaintances. The investigation of aerodynamic loads for the airship *U. S. S. Los Angeles* actually is again inserted as it has been every year since 1928, though, we have reason to believe, no N. A. C. A. engineer has set his foot on board the ship. Is this investigation to outlast the ship and then go on forever?

Bright and outstanding achievements for the N. A. C. A. are not claimed, so we are entitled to believe that there were none.

Small achievements are mentioned and they are creditable. What has been done may have been well done, but nothing worth while doing has been done at all.

To sum up, science is not growing organically in the N. A. C. A. The possibilities are wasted, efforts are not devoted to useful ends, they lead either in the wrong direction or to nowhere. If, as stated, the staff is good, then the management is pitifully bad. No scientific research goes on within the N. A. C. A. and the reports show this.

Three ways exist whereby the laxity of those in active charge of the N. A. C. A. activities may be overcome.

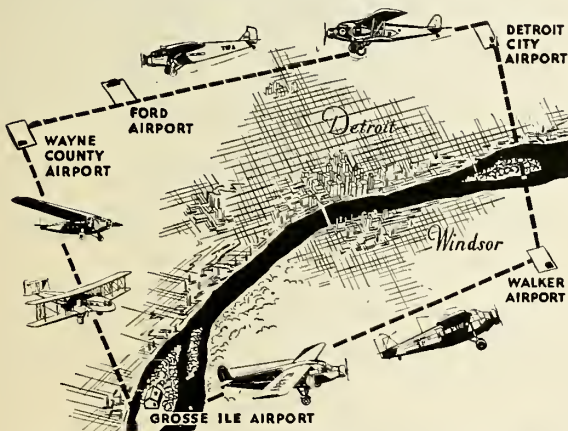
Merge the N. A. C. A. laboratories with those of the Bureau of Standards, with those of the Army Research Department at Wilbur Wright Field, or with those of the Naval Aircraft Factory at Philadelphia.

This would take its direction out of politics and put it into the laboratory, where it belongs.

President Hoover and Mr. Byrns, the chairman of the Appropriations Committee of the House, please note. You are trying to balance the budget. This would help. Also it would be doing much to assist the aviation industry.



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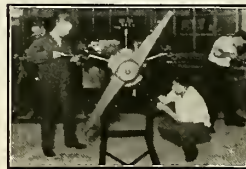
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## HIGH TEMPERATURE AIRCRAFT ENGINES

*(Continued from page 37)*

than one large cylindrical baffled cooler of equivalent area, owing to the fact that the oil distribution is more difficult in the larger cooler.

In order to prevent leakage of the coolant, care must be taken with every joint to select the proper gasket material and to have this material stand up at the high temperatures. It has been found necessary to increase the flow of oil to many parts of the engine for the purpose of keeping these parts at a temperature at which they will operate. If too little oil is supplied to many parts in the engine, it will heat up to a point where lubrication will fail. The added quantity overcomes this condition. In making all joints in the cooling system, special rubber hose must be used which will withstand the action of the high temperature and the coolant liquid. The high temperature appears to be more detrimental to the material than any chemical action of the liquid. In soldering together parts in the system, care must be taken to select a solder which melts at a high temperature so that it will have as much strength as possible.

While a great deal of stress has been placed on the use of high temperature liquid-cooled engines in this country, the British have been working steadily on evaporative cooling with promising results. The loss of coolant liquid is minimized by the use of the evaporative system, as it works at sub-atmospheric pressure in the radiators or condensers. The system weighs less and can be installed in a smaller space than a water-cooled system. Possibly the system can be made as small and as light as a high temperature (250 degrees F.) liquid-cooled system. Development of the evaporative cooling system appears to be receiving consideration everywhere.

The cooling unit of a liquid-cooled engine can be placed in any desired position in the airplane, within practical limits. This is a decided advantage for the type of engine with this cooling as it gives the pilot better vision and provides better aerodynamic efficiency. In the past ten years there has been a decided lack of development on water-cooled radiators. Recent developments in radiator design indicate that large reductions in weight and frontal area may be expected with the core type of radiator. There may be developments in surface radiators for military ships, but such radiators will not be practicable for commercial use unless decided improvements are made in construction as the maintenance cost will be too great.

Recent developments in airplanes indicate that the designers of radiators are beginning to realize the advantage of the proper location of radiators, resulting in higher airplane speeds. The latest Douglas, Boeing, Consolidated and Curtiss military ships have installation of radiators which show the designers are thinking along the right lines. The radiator on a 700-h.p. liquid-cooled engine can be so located in the fuselage that it will not destroy the streamline form of the airplane and will reduce the airplane speed a minimum amount. Retractable radiators are used by some designers and higher speeds at altitudes can be obtained with such installations. Radiators located in a tunnel inside of the fuselage are recommended and the limited use of carefully designed shutters will increase airplane speed and control temperatures.

Oil-cooling becomes a major cooling problem as the output of engines is increased and the coolant temperature is

*(Continued on page 94)*



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## GUYED TO STOCK PROMOTIONS

(Continued from page 32)

called the chairwarmer, hits them on the head with a gavel, the signal that the meeting is adjourned.

Directly responsible to the directors we have the president of the company. He may or may not know anything about the company, but he must wear an air of dignity and a grey pin-stripe suit. Also, it is essential that he be an experienced button-pusher, so that he knows which button to push in order to summon any one of a dozen vice presidents. If by chance he pushes the wrong button and gets an assistant to a vice president, the meeting must adjourn immediately to avert a crisis.

Under the casual supervision of the vice presidents you have the various departments necessary to the running of your company. First in importance we have the vice president in charge of public relations, if any. Of course, there are companies the public haven't heard of at all, which often is just as well; but in case it gets noised about that you have a company, it is the v.p. in charge of public relations who must interpret matters to the press. That is, he must make what is look like what isn't, and what ain't look like what you'd like it to be. In other words, he is the bird who declares that the marble front isn't on common brick or boards, but extends right through to the rear. Usually a retired magician is the fellow for his job.

Now in some companies, the matter ends right there. I mean, all there is to it is the president, the board of directors, and the publicity man. But if you want to go to the extreme of actually building an airplane, it would be well to extend the activities of the publicity department to include an advertising department—because after all you do have to pay for some of the things that get printed about your company. You will naturally object to this, but it can't be helped.

But really, I've already given you six readers enough to get started on this month. Dig up your bankers and brokers, your stockholders, boards of directors, slabs of presidents, and shingles of vice presidents, and next month I'll have the complete factory and sales organization planned out for you to put into effect the very moment Europe pays us the war debts and gets us started off on the next upward swing of prosperity. I understand that Europe has already practically forgiven us for lending her the money. Now all we have to do is to forgive ourselves for having loaned it, and the affair is settled forever.

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A NEW type of rotor plane which incorporates a number of outstanding and important advantages over present types soon will be available for manufacture, under basic patents held by the Penna. Aircraft Syndicate, to companies possessing engineering foresight. The Wilford Gyroplane, which operates on the principle of "Lift Equalization by Feathering," was conceived originally by two German engineers—Walter Rieseler and Walter Kreiser—early in 1922. The basic patents were purchased by the Penna. Aircraft Syndicate in 1928. To date three experimental models have been constructed.

Briefly, the fundamental principles of the Wilford Gyroplane are: (a) The use of feathering blades. (b) The use of blades of high lift section. (c) The use of a rotor which turns aerodynamically at high r.p.m. (d) Rotor control of incidence of blades, giving lateral control at low speeds, where the control of other aircraft is inefficient. (e) The carrying of all centrifugal loads by the interconnection of opposite blades, to provide smoother flight. Theoretical possibilities of the feathering gyroplane were proved by complete wind tunnel tests conducted at the Daniel Guggenheim School of Aeronautics of New York University. Frequent test flights have proved the practical value of the feathering gyroplane principles.

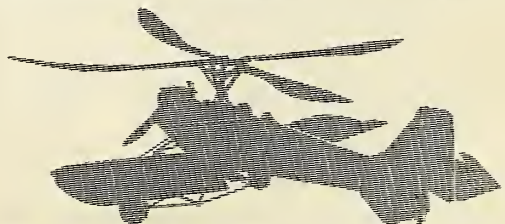
At present the Penna. Aircraft Syndicate is carrying out further research and flight tests of the Wilford Gyroplane. In the very near future manufacturing rights will be made available to companies of established reputation. Investigation now will reveal the interesting results of ten years' study and development, manufacturing details, etc.

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(Continued from page 90)

raised. Coolers should be located in a position to get the maximum slipstream and are subject to development in the same way as the coolant liquid radiators. Any improvements in one radiator will result in an improvement in the other.

The use of higher outlet liquid-coolant temperatures must be accompanied by a loss in power and some reduction in engine life if the temperature is carried too high. The lowest possible temperature should be used consistent with weight and resistance. The latter property is more important on the smaller airplanes. On the large ships, such as bombers where power of the engine is more important than the resistance, the temperature should be as low as possible, even to considering 200 degrees F., which will permit higher supercharging with the standard military fuel. As an example of what can be obtained with lower temperatures, a 35 per cent increase in power was obtained with 180 degrees F. coolant liquid temperature over the power obtained with the engine when operating at 300 degrees F. This remarkable difference might not be found on all engine designs, but it should warrant serious attention from the engine and airplane designers.

Considerable flight testing and dynamometer testing are needed on any liquid-cooled engine to determine the optimum coolant liquid temperature which may vary in the different type airplanes for the best results.

There seems to be a definite field for the liquid-cooled engine in the high power units of over 600 h.p., and as the power increase the advantages of the liquid-cooling become more evident. Complete power units including engine radiator and coolant liquid at a specific weight of 1.5 pounds per horsepower maximum are possible, which is comparable to the high powered air-cooled engines. Therefore, as the range of the airplane increases and the fuel load is considered; the weight of the liquid-cooled engine plus fuel is less than the air-cooled on account of the lower specific fuel consumption of the liquid-cooled engine.

It should not be assumed from the tone of this article that the liquid-cooled engine can or will displace the air-cooled engine; there is a definite place for both types as shown by the fact that both types are used by all countries in the world. The air-cooled engine development has been rapid during the past five years, and in spite of its larger frontal area has been able, through the use of anti-drag cowl rings, to compete in airplane speed with the smaller unsupercharged Vee engine. The low powered engine must be air-cooled on account of the lower initial cost. The liquid-cooled engine with the use of high temperature cooling, either with direct liquid cooling or evaporative cooling, is receiving more consideration than ever by designers, and considerable progress along these lines is expected during the next few years.

## THE FLIGHT SURGEON

(Continued from page 31)

in instant appropriate response to the demands not only of the moment but of the prevailing situation. The flight surgeon should have the unalloyed respect and confidence of the officers whom he serves and their families, and nothing will so encourage this as the combination of fine character and demonstrated professional skill. His bearing and conduct should command the respect and invite the

confidence of the flying personnel of whom he is the adviser.

The relationship which he should establish between himself and the flying personnel whom he serves should be (in a qualified way) quite akin to that relationship so long and beneficently identified as existing between the old family physician and his clientele. Positive and forceful in his decision designed to safeguard life and property, the flight surgeon should develop tolerance, be slow to criticize but abundant in encouragement, and command recognition as an influence promoting the general good, on the ground and in the air. He is better identified in his field of endeavor as an inspiration to the maintenance of physical fitness to perform any and all flying missions than as a mere healer of ills incident to the vicissitudes of the body. In order to know and understand the flying personnel and their reaction patterns, tendencies, and capabilities, the flight surgeon must cultivate the social contacts open to him. The most valuable information about the pilot is gathered by seeing him in his element, the air, in the performance of his real tasks. Therefore the flight surgeon should, whenever occasion presents, fly with his associates under all conditions.

More than half of the twenty-six accidents occurring in 1931 were directly traceable to human errors of the pilot, and examination of the records shows that in about seventy-five per cent of the non-fatal aircraft accidents human error was a contributor in whole or in part. Several hundred thousands of dollars were lost in these accidents. Unquestionably a moderate amount, if not a considerable number of them, might have been prevented, had the proper supervision been made possible by the provision of an adequate number of qualified flight surgeons.

**EDITORIALS**

*(Continued from page 38)*

development lag any more than we must let surface highway development lag. Congress should give the Department of Commerce all the money it needs for the proper development of Federal Airways. They help business and add to national security at a slighter cost, compared to their usefulness, than any other project.

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That travelers now can go by air as cheaply as by rail, if Pullman fare be included, which, considering the time-saving, means at rates much lower than those offered by the railways, promises great things for the future. This circumstance alone should double the amount of air passenger traffic when general conditions have swung back to normal.

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**FOR SALE:** Travel Air A6000A with Wasp, 75 hours since overhaul; landing lights, couch, toilet compartment, generator, flare brackets, hand and electric inertia starter. Excellent condition, engine checked every 10 hours. Formerly owned by Wallace Beery. Attractive price. Bellanca Aircraft Corporation, New Castle, Delaware.

**\$895 BUYS** sweetest little Buhl Bull Pup that ever banked a wing. Like new. 87 hours. 45 horse Szekeley. All instruments. Airwheels. Lands slow, cruises 82, does 98. Operating cost, \$1.05 hourly. Original owner. Always hangared. No "light" plane; licensed for pay load, hence time applies on transport license. Herh. Laube, 441 Westminster, Elizabeth, New Jersey. Phone 3-0756.

**NICHOLAS-BEAZLEY** side-by-side Trainer, 80 h.p. Genet mntor, taken in trade. Operated only 43 hours. Perfect condition. List price, \$1790. Will sell, \$945. Air Travel, Inc., Little Rock, Arkansas.

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**WACO** cabin demonstrator, perfect, \$3900. Three OX-5 motors, \$125, one with complete overhaul. New York Aircraft Distributors, Inc., Floyd Bennett Field, Brooklyn, N. Y.

**FOR SALE:** Licensed two-place American Eaglet. Szekeley 30 h.p. engine. Total time 22 hours. Always hangared. Same as new. \$700 flyaway. V. T. Leak, Box 1655, Riverside Station, Miami, Florida.

**FOR SALE:** New OX-5 motor, used less than 40 hours; complete with stacks and propeller hub. Price crated, \$100. Address John Ruzicka, Kanona, Kansas.

**FOR SALE:** 2 engines, Wright J-6 300; modernized but in need of overhaul. Total time, 593 hours and 311 hours. Make offer. Bellanca Aircraft Corporation, New Castle, Del.

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**LATE 1930 STINSON JUNIOR**, four-place, Lycoming powered. Ship and motor like new. Fifty hours since major overhaul. Never in accident. Extra equipment. Turn and bank indicator. Leather upholstery. Oversize tires. Real bargain. Write Bacon-Householder Co., 304 Gorham Bldg., Minneapolis, Minn.

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**FOR SALE:** Laird LCRW, Wasp, earth inductor compass, climb indicator; ship good condition, 86 hours since overhaul. Price on application Bellanca Aircraft Corp., New Castle, Del.

**INLAND SPORTSTER**, Warner 90 h.p., like new, Steel prop, semi-airwheels, complete instruments. Special paint job. New August 1930; 300 hours. \$1,600. Oakland Flying Service, Alameda Airport, Alameda, California.

**FOR SALE:** Waco "F", Warner, excellent condition. For quick sale, \$2250. Waco Glider (new) crated, \$75. Curtiss OXX6 motor, just overhauled, equipped with one Scintilla and one Dixie Magneto, crated, \$125. Many new and used parts. Robbins Flying Service, Akron, Ohio.

**CURTISS-WRIGHT JUNIOR:** Only 176 honest hours. Like new. Licensed. A bargain at \$795. Joplin Airways, Inc., Joplin, Missouri.

**CESSNA**, Wright 300 h.p. Excellent condition. Total time 57 hours hours factory test work. Newly set up and recovered by factory. \$3000 cash. AERO DIGEST, Box 1261.

**FOR SALE:** J-6-5, 85 hours since new, with steel prop. Or will trade for Monocoupe, Gipsy Moth or Aerona. Also have any metal parts you want for Curtiss Robin. Write C. F. McKinney, 312A Avenue West, Cedar Rapids, Iowa.

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**KINNER K5**, No. 1147, good shape; 300 hours. Best offer over \$275. Philip Meinke, Willoughby, Ohio. Can be seen at Thompson Aeronautical, Cleveland, Ohio.

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**FOR SALE:** Brand new Szekeley-powered Buhl Bull Pup. This little ship licensed and equipped with airwheels. Price \$900. Will accept good automobile as part payment. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

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## Used Planes and Engines

\$\$\$ CAN BE SAVED by quick action. We must sacrifice the following to make room for Waco Demonstrators. Will demonstrate and deliver free in New England; outside for half expenses. **ARISTOCRAT CABIN**, 165 b.p. Continental, 3-place; fast, with top speed of 125 m.p.h. Motor and ship 125 hours. Always banged. Licensed to July 1932. Splendid buy at \$1700. **WACO F**, 110 Warner, color and equipment standard, fuselage and wings recovered. Total time 300 hours; only 35 since complete overhaul. Passengers think it is a new ship. \$500 off market value at \$2000. **N-B TRAINERS**, two, 85 b.p. Genet. Both demonstrators; one 60 hours, other 100 hours. Look like new. 35% off list price, \$1350 each. **EAGLET**, 45 b.p. Szekely, less than 100 hours. New prop, little wear, paint perfect. Low price, \$750. **ARROW SPORT**, 150 hours; 25 since complete overhaul; fine condition, \$800. **ALL SHIPS NC LICENSED.** What Cheer Airport, Pawtucket, Providence, R. I. Perry 0889.

**STINSON 6-place**, J5 motor, licensed, semi-airwheels, stressed and licensable for 300 motor; landing lights. \$1900. Knowles Flying Service, City Airport, Detroit, Michigan.

**FOR SALE:** J-5 Pictair Mailwing, 312 hours total time; 60 since complete overhaul. Perfect shape. Dual instruments, flares and landing lights. Price for quick cash sale, \$1800. **AERO DIGEST**, Box 1233.

**TRAVEL AIR OXX6**, excellent condition, \$450 cash. A real buy. **AERO DIGEST**, Box 1234.

**GREAT LAKES TRAINER**, overhauled and relicensed, \$1100. Challenger, overhauled and wings recovered, \$700. Aerona Scout, factory rebuilt motor, \$775. LeBlond Sixty, complete with propeller, \$175. OX-5, \$50 up. Hite & Moore, Bristol, Penna.

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**SEAPLANE:** Licensed Curtiss M F Boat, OXX-6 motor, excellent condition. No reasonable offer refused; or trade for light plane. Terms, Lieut. J. N. Zeller, U.S.S. Cayuga, C. G., Staten Island, N. Y.

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**WACO, TRAVEL AIR**, from \$250 up. Airplanes bought, sold and traded. Write your needs or send 10¢ for list. Pioneer Used Airplane Exchange, Airport, Syracuse, N. Y.

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**J-5, JUST** completely overhauled. Guaranteed job. Will sell with propeller for \$600. This motor is less than 18 months old. Also have J-5 with top overhaul (11 hours since overhaul), sacrifice for \$450. Both jobs guaranteed. Emil Roth, Jr., Fayetteville, N. Y.

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**GREAT LAKES**, excellent condition, licensed. Must sell. Or would like party to make small investment. Airport propositon. Fred Guss, Port Jervis Airport, Port Jervis, N. Y.

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**FOR SALE, \$150:** Kreider-Reisner Challenger, Serial No. 236, less wings, center section and propeller. C. N. Pickell, Kingston, N. C.

**FOR SALE:** Ryan B-1, just relicensed and in excellent condition. Will take as part payment a good dual control airplane. A. W. Hinaman, Williamsport, Penna.

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(Continued on next page)

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## Miscellaneous Products & Equipment For Sale

**FOR SALE:** Upper and lower right wings and tail surfaces for Model 10 or 90 Waco; also new Waco glider. Prices very reasonable. Tex LaGrone, 435 Knickerbocker Place, Kansas City, Missouri.

**FOR SALE:** Used K-5 Kinner parts in good condition, cheap. Heads, cylinders, magnetos, carburetors, etc. The Three Hawks Flying Service, 85 N. Lyndale, Minneapolis, Minn.

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**ZENITH ALTIMETER** and liquid type lateral banking indicator, two complete instruments for \$5.00. Special pursuit high altitude, 26-28,000 foot altimeters, \$7.00. Banking indicator, \$1.00. Liquid type inclinometer, \$7.00. 750 x 125 wheels, \$4.00. Turnbuckles, 7 and 10 cents. Robert F. Britton, 4218 Lindell Boulevard, St. Louis, Missouri.

**ASSEMBLE** your Corben Baby Ace Sportplane from our complete semi-built kits. All major parts and units are factory built. Send dime for detailed literature. Corben Sportplane Supply, Peru, Indiana.

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**FOR SALE:** Long wing Eaglerock uppers, \$150; fuselage for above, \$50; set of elevators and stabilizers, \$50; D. H. wheels, tires, \$15; twelve struts for above, \$15; cowlings for OX-5 Eaglerock, \$10. John Krauss, Mission, South Dakota.

**REAL BARGAINS:** Set of Waco Nine upper wings, ailerons, struts, all in good condition, \$30. Good OX-5 with new extras, \$20. Heath wings almost completed, \$15. James McLean, Roseville, Ohio.

**SPARTAN 1929 C-3** upper left, lower right wings, wheels, tires, tail unit, all for \$125. Now stored at Hutchinson, Kansas. Consider trades. Write Diamond Airport, 519 West Summit Avenue, San Antonio, Texas.

**FOR SALE:** Ryan B1 and Robin used parts cheap. J-5 motor completely overhauled with metal propeller and starter, \$300. Want J-6-9. Peter Klimek, 1811 First Ave. So., Minneapolis, Minn.

**LIGHT PLANE DURAL FUSELAGES.** No welding, no brazing, no riveting, no strap or heavy cast terminals. Save weight. Easy to build. No special tools or parts required. 10c. in stamps tells how. Roman B. Maliszewski, 1606 East Bellevue Place, Milwaukee, Wisconsin.

**FLIGHTEX COVERS COMPLETE,** for Waco, Travel Air, Eaglerock, Swallow, American Eagle, Command-Aire, Lincoln Page; other like hiplanes, \$75. Fuselage covers, \$14; wing covers, \$12; others proportionately. 10 gallons dope, \$125 gallon; thinner, \$1.50 gallon. Supplies, Ostergaard Aircraft, 4305 North Narragansett, Chicago, Ill.

**BUTTER-KIST** Popcorn machine: cost over \$1,000. Big money-maker on the airport. Condition like new. Will sell for \$250. AERO DIGEST, Box 1292.

**HANGAR,** with office and repair shop attached to side. 80' x 60', no supporting columns in hangar. Door opening, 75' x 14'9" in the clear; Richards-Wilcox hardware. All side walls glassed; covering rustless copperloy. For information, write Jo. Wetzel, 61 Wall St., Trenton, N. J.

**SURPLUS STOCK** for sale. Make us an offer on any of this merchandise: 30 x 5 wheels, tires, tubes and streamlines. Bendix wheels, 30 x 5, with brakes. Inertia starter for J-5. Hisso and OX Waco radiators. One E-180 h.p. Hisso complete, perfect condition, crated ready to ship. All J-4 J-5's. OX Waco landing gear V's. Hisso- or Whirlwind-Hartzell propeller. J-5 steel propellers. 200 h.p. Whirlwind Waco. J-6-5 Travel Air. Waco Ten wings. Write or wire Erie Isle Airways, Put-in-Bay, Ohio.

**FOR SALE:** Complete set of flying instruments in A-1 condition, for sale cheap. Will sell whole or part. Set consists of 8 Pioneer instruments. AERO DIGEST, Box 1298.

**ANY PART OF OX-5 ROBIN** or Travel Air 6600. New Paragon prop for Moth; Velic motor; or what do you need? Everything priced to sell. H. W. Schwieters, Hadley Field, New Brunswick, N. J.

## Wanted To Buy Or Trade

**ATTENTION, DRILLING CONTRACTORS,** oil operators: Will trade, f.o.b. Blackwell, Oklahoma, Star "30" Drilling Rig, complete; 45 h.p. boiler and complete string of drilling tools, including cordage, for high class airplane. Must be good. Write or wire Wagsmore Drilling Company, 222 South Main Street, Blackwell, Oklahoma.

**WANTED:** A good two-place Aerona; must be licensed and priced less than \$500. Cash proposition. AERO DIGEST, Box 1278.

**WANTED:** Three-place open biplane of standard make, in trade for my free-wheeling Chevrolet sedan with hot-water heater, shutters and extra. OX job will do. Oscar C. Rumph, Waukon, Iowa.

**WANTED:** Best cash buy in licensed Robin, Stinson, Monocoupe, Moth, Bird, Waco or similar ship. Describe fully. C. J. McBride, 257 South 16th Street, Philadelphia, Penna.

**WANTED:** Both lower wings for Hisso Travel Air model 3000, in good or damaged condition. Wings from J-5 model o.k. Also new production underslung Hisso radiator. E. F. Smith, Standard Air Service, Box E, Hasbrouck Heights, New Jersey.

**WANTED:** Recently licensed Davis monoplane or similar plane. Must be cheap. Also desire terms. James McLean, Roseville, Ohio.

**WANTED:** Waco F, Warner motor preferred. Will pay cash if priced right. Answer quick, Glen W. Fellows, 1406 Union and Peoples National Bank, Jackson, Michigan.

**WANTED:** Have cash for a two- or three-place air-cooled ship. Will consider an OX if priced very cheap. Harry Deuter Garage, 318 West Washington, Fort Wayne, Indiana.

**WANTED:** Used motor, 45-125 h.p. Also set of floats. Plane weight, 1250. Must be cheap. Laurence Hottie, 289 Regent St., Sudbury, Ontario, Canada.

**WANTED:** Licensed ship, in first class condition. No cracks, etc. Prefer Waco F, Bird, Fleet Trainer, Fairchild "22," late Monocoupe or Great Lakes. Price under \$1500. What have you for cash? Give history. Address, A. H. Swett, Jr., 113 Sussex Avenue, Newark, N. J.

**WILL BUY FOR CASH,** if priced right, Great Lakes model 2T-1A-type A, airwheels and brakes; must be in good condition. State full particulars. AERO DIGEST, Box 1289.

**WANTED:** Best buy in slightly used, late model, 100 h.p. Kinner, with new type head, New Standard Flying Service, Box E, Hasbrouck Heights, New Jersey.

**WANTED:** Spartan C-3 right lower wing; right and left landing gear vees; one shock strut assembly; and one Siemens "nine" propeller with hub. State condition and lowest acceptable price. Frank Bowman, Jr., Berino, New Mexico.

**\$500 CASH** for best two or three place licensed radial or inline open ship. Will consider minor crackup. Send all particulars and photo. Roy Calkins, National Supply Co., Longview, Texas.

**AMPHIBIONS** and flying boats wanted. Please describe fully, giving best price. AERO DIGEST, Box 1296.

**WILL TRADE** 20 horsepower Evinrude outboard for light airplane motor. Must be in good condition. AERO DIGEST, Box 1293.

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The cost is little—only 10c. a word (\$2.50 minimum), payable in advance. Forms for the April issue close March 21st. Send us your copy now.

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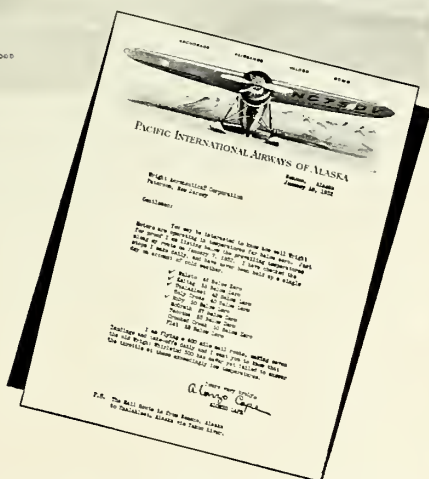
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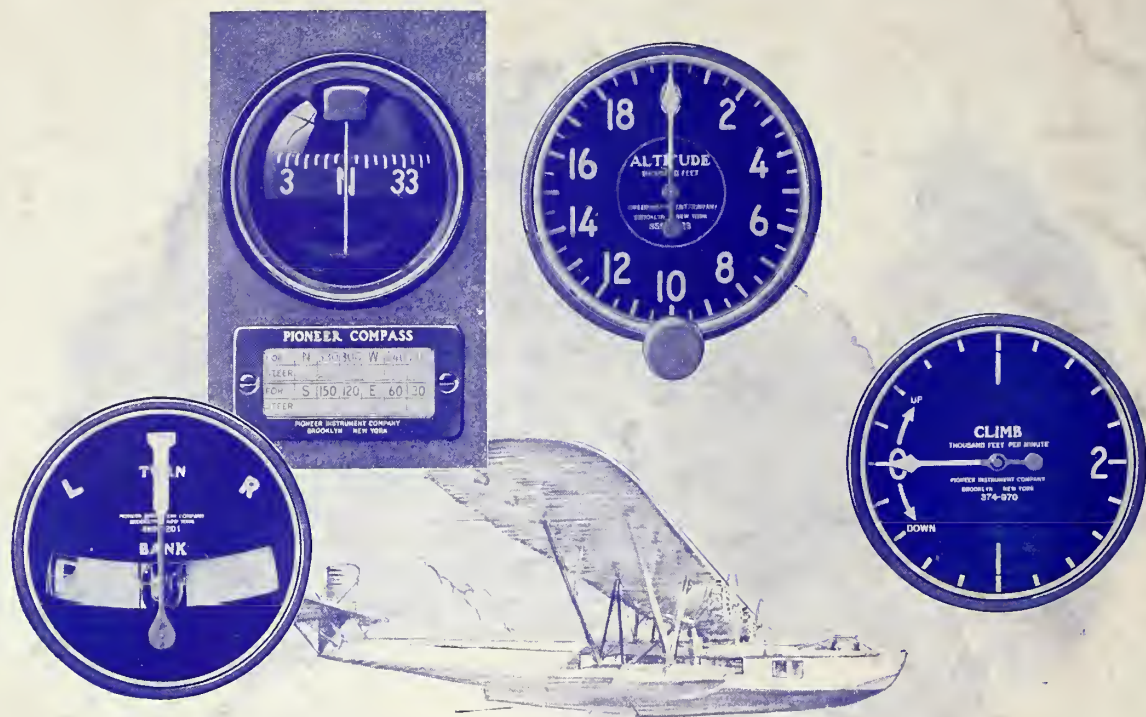
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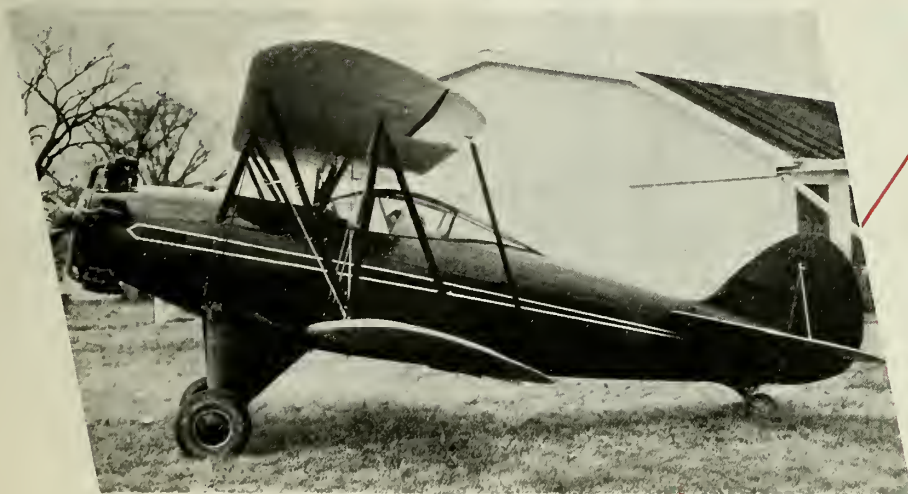


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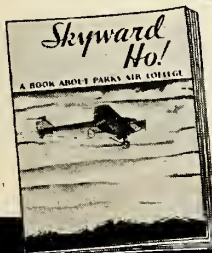
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Building and Flying Model Aircraft

by Paul Eduard Garber, Smithsonian Institution. 198 illustrations, \$2.25 (By mail, \$2.45).  
 A complete course in model building—the official book of the Playground and Recreation Association of America, the association carrying the endorsements of Wright, Lindbergh, and Byrd. Provides full instructions for building fifteen types of model aircraft, with data on sixteen others from which models can be built. Large, easily-followed drawings make every step clear. Covers all types of models, wooden and metal parts, propellers, materials, tools, alignment for successful flight, etc., etc.

Airplane Mechanics Rigging Handbook

by R. S. Hartz, formerly Lieut. Colonel, Air Corps, U. S. Army; and Lieut. E. E. Hall, formerly Editor, "Aircraft Servicing." 104 illustrations, \$3.50



This book tells all about the rigging, maintenance, inspection, and repair of airplanes, showing just how to get an airplane into safe flying condition and then keep it that way. The instructions show how each operation should be done, what the proper order is, and the reasons why. Covers fifty handling planes on the ground and in the shop; sequence of rigging steps; how to true up the assembled ship; how to adjust the wings and control surfaces for "hands off" flying; the materials of patching, splicing, and repairing of all kinds; practical hints for riggers; installing and correcting compasses, etc., etc.

Engineering Aerodynamics

by Lieut. Cmdr. Walter S. Diehl, (C. C.) U. S. N.; Scientific Section, Bureau of Aeronautics. 159 illustrations, \$7.00



In this book America's acknowledged authority covers modern hydrodynamic theory and its practical applications, including stream function, velocity potential, circulation, vortex theory, induction theory, etc. Test data on standard wing sections, airfoils, streamlining, etc., are included, with working diagrams and equations, and detailed instructions for their use. Shows how to interpret model test data, gives methods for designing control surfaces, and for rapid performance estimation.

Airplane Stress Analysis

by Alexander Klemin, Director, Guggenheim School of Aeronautics, N. Y. University. 105 illustrations, \$7.00



An introductory treatise showing step by step how to make all the calculations in the airplane stress analysis required by the Department of Commerce. The book is intensely practical—each point is explained with the utmost clearness and simplicity. A preliminary review explains the principles of applied mechanics involved. Tables giving the stress data constantly needed by engineers on steel, wood, tubing, hard wire, steel cable, tie-rods, rivets, bolts, wheels, tail-loads, etc., are included.

Gliders and Gliding

by Lieut. Cmdr. Ralph S. Barnaby, Scientific Section, Bureau of Aeronautics, U. S. Navy; First American First-Class Licensed Glider Pilot. 123 illustrations, \$3.00



A practical handbook for glider flyers and builders. Gives a detailed, progressive course in flight training, with full information about types of gliders, ground and wind conditions, launching, first flight, maneuvering the glider, and landing. Starts with primary instructions and progresses through secondary training to a full course in soaring. Contains useful data on design principles, structural details, materials, assembling, rigging and aligning.

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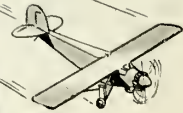
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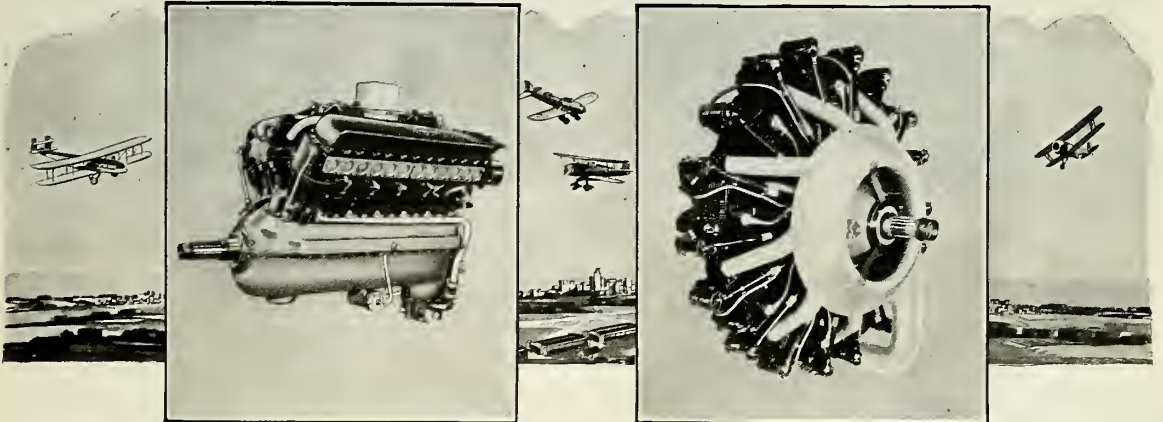
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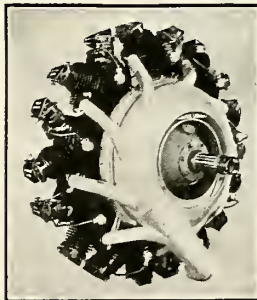
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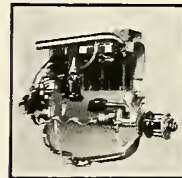
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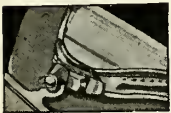
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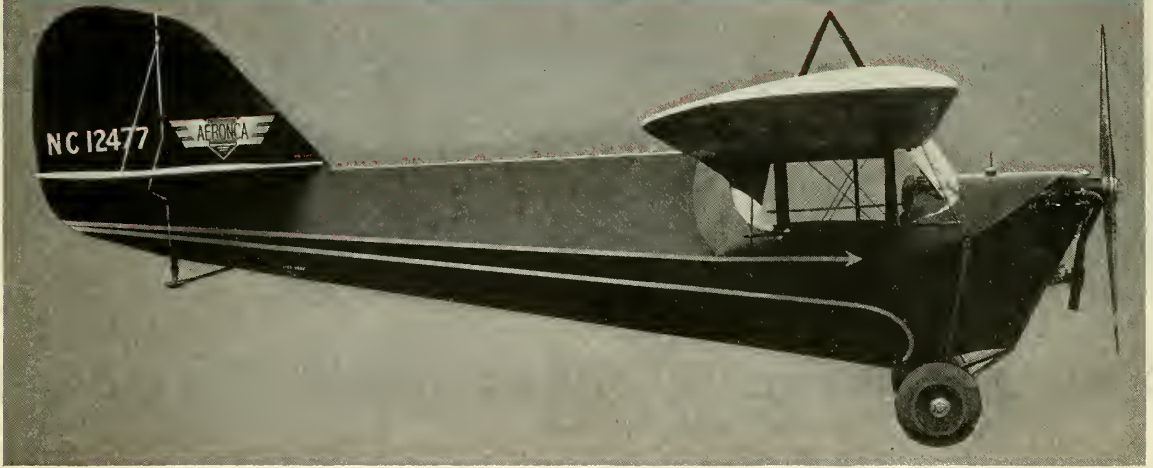
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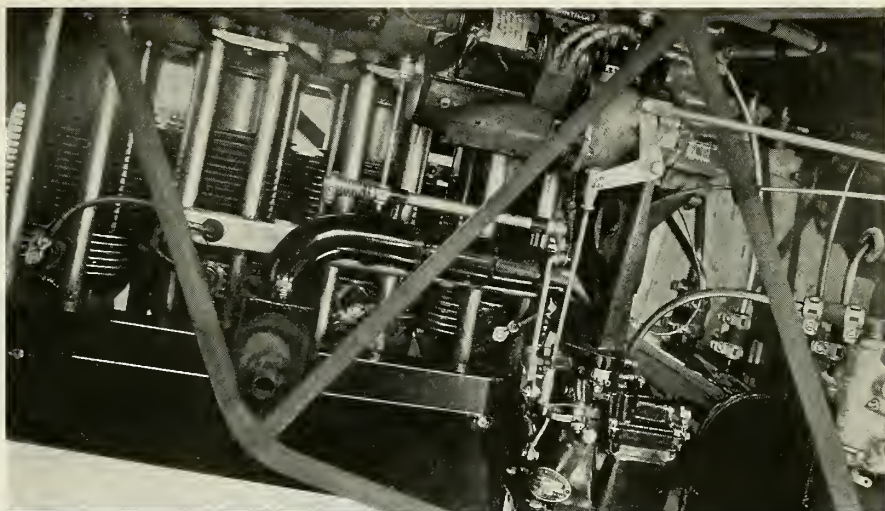
The mere fact that the FAIRCHILD 24 is ideal for the owner-pilots and is certain to be popular with them makes it a good airplane for the operator who gives instruction. With it he can give instruction to the owner-pilot who is a prospective purchaser for this type of airplane. Also, it will enable the operator to supply the ever growing demand for cabin airplane instruction. For cross-country flying instruction and winter instruction the cabin airplane has very definite advantages. The low operating and maintenance costs of the FAIRCHILD 24, along with its low initial cost, also recommend it to the operator.

The CIRRUS Hi-Drive is a four cylinder, in-line, inverted engine. In the "24" it allows the pilot to sit well above the cowl-ing line so that he may see the ground im-

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value, FAIRCHILD offers the new "24"

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Landing, touch to stop . . . . .	150 ft. 5 sec.	Dihedral . . . . .	1½ deg.
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High speed . . . . .	116 m.p.h.	Height . . . . .	7 ft. 9 in.
Cruising speed . . . . .	96 m.p.h.	Tread . . . . .	7 ft. 8 in.
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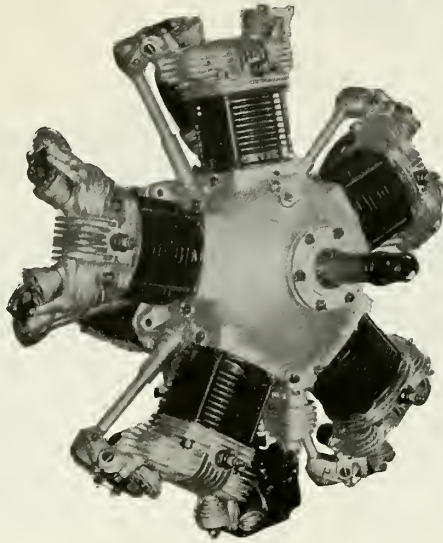
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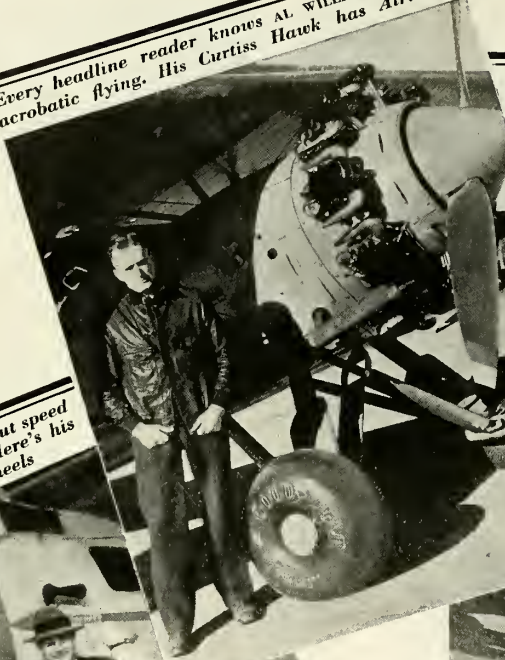
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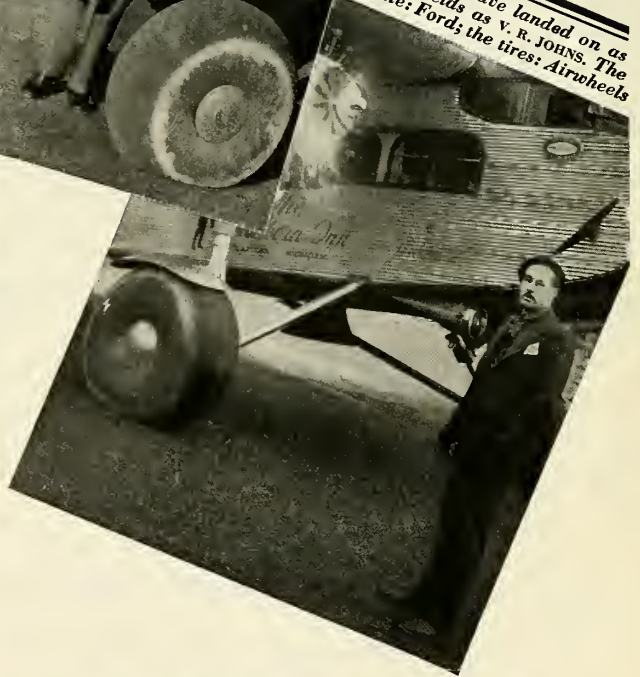
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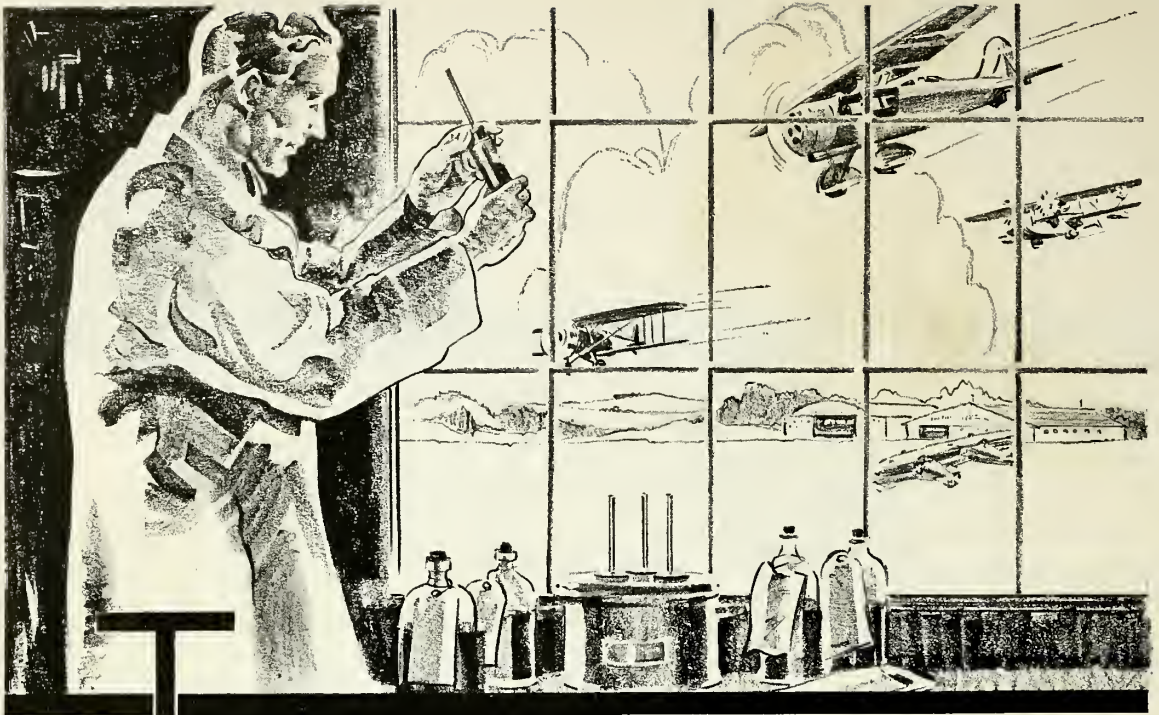
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# AERO DIGEST

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*Detroit News Photo*

Above the Business District of Detroit, the Air Show City

# THE NATIONAL AIRCRAFT SHOW

**Detroit City Airport, Detroit, Michigan, April 2 to 10, 1932**

**F**OR the fifth consecutive year, Detroit will stage a major aircraft show, the only major industrial exhibition to be held by the industry during 1932; this will be the third show to be held in the million-dollar municipal hangar, the largest in the world. Two previous shows held in the Convention Hall, while successful, offered no opportunity for manufacturers to give flight demonstrations of the planes. At the Detroit City Airport not only are the exhibition and flying facilities ideal but the experience of the management, under the direction of Ray Cooper, assures a smooth-working organization.

This year, there will be more than twenty-four manufacturers exhibiting airplanes. Besides these, several governmental departments will exhibit aircraft and engines, some of them being shown publicly for the first time. Engine and accessory manufacturers, etc., to display their wares total about one hundred. Much activity is expected on the 260-acre airport on which the hangar stands. As the field is lighted, night flying is to be one of the features to attract the public.

An international air tour of miniature proportions but of practical character will be a salient feature of the show. This model airline, operating over a sixty-mile route within the vicinity of Detroit, and including a stop on Walker Airport, Walkerville, Canada, will constitute a new idea in air show experience. Operated jointly by several representative American airline companies and using the lines' own equipment, the model line will serve to demonstrate the advantages offered the air traveler. The airline will include stops at Ford Airport, Wayne County Airport and Grosse Ile Airport.

Through the cooperation of the U. S. Army Air Corps and the Bureau of Aeronautics, U. S. Navy, the show will have on display five of the latest types of Army Air Corps pursuit and observation planes and two most recent additions to the Navy's aerial fleet.

Planes to be exhibited by the Army Air Corps will consist of the type P-12E Boeing pursuit plane, the Berliner-Joyce two-seater pursuit ship, the model P-6E Curtiss *Hawk* pursuit plane, the model O-39 Curtiss *Falcon* observation plane, and one type O-25-A two-place Douglas observation plane.

Two Navy ships will be exhibited. The single-place Curtiss XF9C-1 fighter, one of five similar airplanes to be carried in a special hangar aboard the Navy's dirigible, *Akron*, and a Vought O3U-2, a two-place observation plane of the type used on aircraft carriers.

Surrounding the military exhibit the show will have more than fifty commercial airplanes ranging from tiny "flivver planes" to huge craft of the transport type.

The new Kellett autogiro will be displayed in an exposition for the first time. Two models will be shown, the K-2, a two-place open type and the K-3, a two place cabin type.

The Wasp-engined Laird racer, *Solution* in which Major Doolittle flew from Burbank, Calif., to Newark, N. J., in 11 hours, 16 minutes last fall, will be on display in the booth of United Aircraft & Transport Corporation, through the courtesy of its owners, a group of Cleveland

sportsmen.

The Ford exhibit, presented in one of the largest spaces available, will include a de luxe trimotor club plane, a standard trimotor transport and an airplane skeleton intended to emphasize the finished structure of the Ford trimotor transport. The de luxe club plane to be exhibited is the most luxurious trimotor transport ever built by the Ford airplane factory.

Headquarters of the show will be at the Statler Hotel and that hotel will be the scene of many of the various meetings to be held during the exposition. Among the organizations which will meet here during that period are the Society of Automotive Engineers, on Tuesday evening, April 5, and also morning and afternoon sessions, April 6 and 7; the National Association of State Aviation Officials, April 8 at 10 a.m. and 2:30 p.m.; and various sections of the Aeronautical Chamber of Commerce. There will also be a dinner by the Exchange Clubs, April 5, and a meeting of the Quiet Birdmen, April 6. No meeting of the Early Birds organization was scheduled at the time of going to press, but the AERO DIGEST booth will be temporary headquarters where members may register and get in touch with other members who are in Detroit during the air show.

Formal award of the famous Bendix trophies to Major James H. Doolittle, H. S. Johnson and Beeler Blevins, winners of first, second and third places in the transcontinental speed classic of the 1931 National Air Races, will be made during the Show.

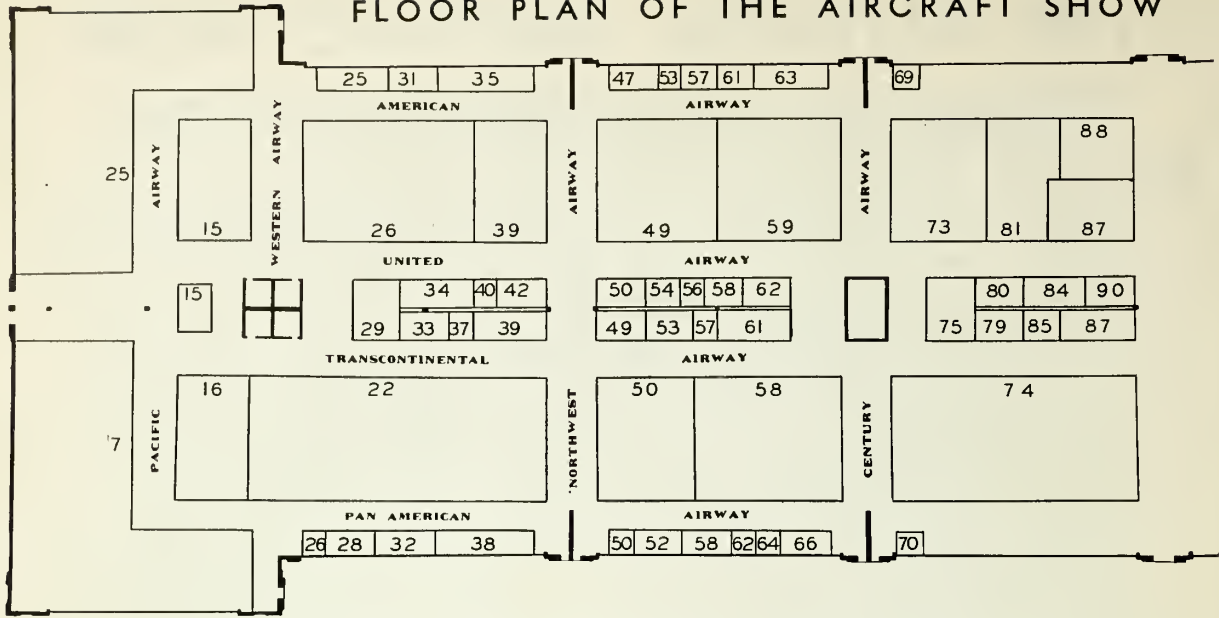
Harold Gatty, of the famous Post and Gatty team of airmen who flew around the world in eight days, will be among many to speak before sessions of the Society of Automotive Engineers when that society meets during the week. Other prominent S. A. E. speakers, according to A. J. Underwood, Director of Aeronautic Activities for the organization, include O. W. Schley, N. A. C. A.; Ralph Upson, designer; D. L. Pellett, Department of Aeronautical Engineering, University of Cincinnati; John G. Lee, American Airplane & Engine Corp.; Luther K. Harris, Ludington Air Lines; R. M. Hazen, American Airplane & Engine Corp.; A. E. Larsen, Pitcairn Aircraft, Inc.; and Professor E. S. Taylor, Massachusetts Institute of Technology.

A dinner tendered jointly by the Society of Automotive Engineers, the Aeronautical Chamber of Commerce of America and the Detroit Section, S. A. E., will take place on the evening of Thursday, April 7 at the Hotel Statler, air show headquarters. William B. Stout will be toastmaster at the dinner.

In line with the air transport feature of the show, the aiseways within the huge exposition building will bear the names of prominent operators, the selected names being Transcontinental Airway, United Airway, Pan American Airway, Canadian Airway, Ludington Airway, Trans-american Airway, Century Airway, American Airway, Pacific Airway, Western Airway, Northwest Airway, Pennsylvania Airway and Eastern Airway.

On the next two pages following are lists of the exhibitors and spaces they will occupy. Numbers in the lists refer to corresponding numbers on the floor plan.

## FLOOR PLAN OF THE AIRCRAFT SHOW



## ALPHABETICAL LIST OF AIR SHOW EXHIBITORS

Showing Their Locations in the Hangar Exhibition Building, Detroit City Airport

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**AIRPLANE  
COMPANIES**


---

Acronautical Corp. of Amer.  
Cincinnati, Ohio  
(39) *United Airway*

Amer. Airplane & Eng. Corp.  
Farmingdale, L. I., New York  
(50) *Transcontinental Airway*

Amphibions, Incorporated  
Garden City, L. I. New York  
(4) *Eastern Airway*

Bellanca Aircraft Corporation  
New Castle, Delaware  
(97) *United Airway*

Bird Aircraft Corporation  
Glendale, L. I., New York  
(122) *Transcontinental Airway*

Boeing Airplane Company  
Seattle, Washington  
(149) *Canadian Airway*

Brazil Aircraft Corporation  
Brazil, Indiana  
(122) *American Airway*

Chance Vought Corporation  
Hartford, Connecticut  
(149) *Canadian Airway*

Curtiss-Wright Airplane Co.  
Robertson, Missouri  
(22) *Transcontinental Airway*

Curtiss Aeroplane & Motor Co.  
Buffalo, New York  
(22) *Transcontinental Airway*

Fairchild Aviation Corp.  
New York City, New York  
(73) *United Airway*

Ford Motor Company  
Dearborn, Michigan  
(150) *Canadian Airway*

Great Lakes Aircraft Corp.  
Cleveland, Ohio  
(59) *United Airway*

Heath Aircraft Corporation  
Niles, Michigan  
(121) *United Airway*

Kellett Autogiro Corporation  
Philadelphia, Pennsylvania  
(87) *United Airway*

Monocoupe Corporation  
Robertson, Missouri  
(58) *Transcontinental Airway*

Nicholas-Beazley Airplane Co.  
Marshall, Missouri  
(15) *United Airway*

Penna. Aircraft Syndicate  
Philadelphia, Pennsylvania  
(127) *United Airway*

Pitcairn Aircraft, Inc.  
Willow Grove, Pennsylvania  
(7) *Pacific Airway*

Rearwin Airplanes, Inc.  
Kansas City, Kansas  
(88) *American Airway*

Stearman Aircraft Company  
Wichita, Kansas  
(149) *Canadian Airway*

Stinson Aircraft Corporation  
Wayne, Michigan  
(25) *Pacific Airway*

Taylor Bros. Aircraft Corp.  
Bradford, Pennsylvania  
(130) *American Airway*

Waco Aircraft Company  
Troy, Ohio  
(74) *Transcontinental Airway*

---

**OTHER  
COMPANIES**


---

A. C. E. Corporation  
Marysville, Michigan  
(58) *United Airway*

Aero Digest  
New York City, New York  
(125) *Transcontinental Airway*

Aeromarine Plane & Motor Co.  
Keypoint, New Jersey  
(105) *American Airway*

Aero. Chamber of Commerce  
New York City, New York  
(80) *United Airway*

Aircraft Age  
Kansas City, Missouri  
(108) *United Airway*

Air Reduction Sales Company  
New York City, New York  
(58) *Pan American Airway*

Aluminum Co. of America  
Pittsburgh, Pennsylvania  
(38) *Pan American Airway*

Amer. Airplane & Engine Corp.  
Farmingdale, L. I., New York  
(50) *Transcontinental Airway*

Aviation  
New York City, New York  
(79) *Transcontinental Airway*

Aviation Engineering  
Flushing, L. I., New York  
(132) *United Airway*

B. G. Corporation  
New York City, New York  
(85) *Transcontinental Airway*

Bendix Brake Company  
South Bend, Indiana  
(122) *Pan American Airway*

Bendix-Stromberg Carburetor  
Chicago, Illinois  
(122) *Pan American Airway*

Berry Brothers, Incorporated  
Detroit, Michigan  
(125) *American Airway*

Boeing Air Transport  
Seattle, Washington  
(149) *Canadian Airway*

Breeze Corporations, Inc.  
Newark, New Jersey  
(111) *Transcontinental Airway*

Cardinal Model Supply Co.  
Detroit, Michigan  
(69) *Pan American Airway*

Champion Spark Plug Co.  
Toledo, Ohio  
(109) *American Airway*

Cleveland Pneumatic Tool Co.  
Cleveland, Ohio  
(66) *Pan American Airway*

Continental Aircraft Engine  
Detroit, Michigan  
(87) *Transcontinental Airway*

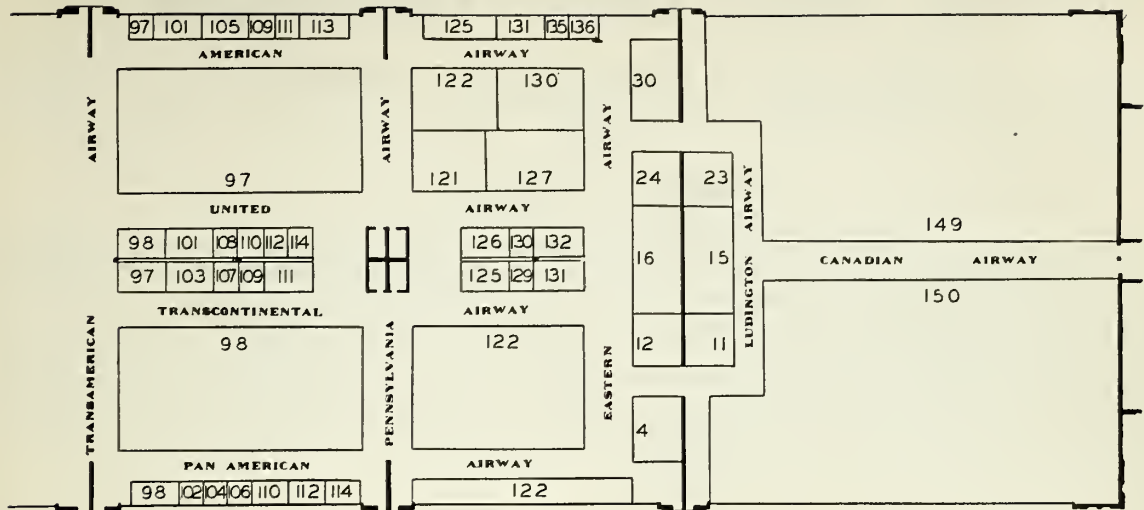
Curtiss-Wright Flying Serv.  
New York City, New York  
(26) *Pan American Airway*

Curtiss Aeroplane & Motor  
Buffalo, New York  
(22) *Transcontinental Airway*

The Detroit News  
Detroit, Michigan  
(11) *Ludington Airway*

Dow Chemical Company  
Midland, Michigan  
(90) *United Airway*





Eclipse Aviation Corporation  
East Orange, New Jersey  
(114) *Pan American Airway*

Edo Aircraft Corporation  
College Point, L. I., New York  
(50) *Pan American Airway*

Elgin National Watch Co.  
Elgin, Illinois  
(110) *Pan American Airway*

Engineering & Research Corp.  
Washington, D. C.  
(111) *American Airway*

Evans Appliance Company  
Detroit, Michigan  
(136) *American Airway*

Ex-Cello-O Aircraft & Tool  
Detroit, Michigan  
(35) *American Airway*

Fafnir Bearing Company  
New Britain, Connecticut  
(109) *Transcontinental Airway*

O. R. Forester  
Detroit, Michigan  
(54) *United Airway*

Julien P. Friez & Sons  
Baltimore, Maryland  
(122) *Pan American Airway*

General Electric Company  
Schenectady, New York  
(30) *Eastern Airway*

Guiberson Diesel Engine Co.  
Dallas, Texas  
(29) *Transcontinental Airway*

Gulf Refining Company  
Pittsburgh, Pennsylvania  
(131) *Transcontinental Airway*

Hamilton Standard Propeller  
East Hartford, Connecticut  
(149) *Canadian Airway*

Haskelite Manufacturing Co.  
Chicago, Illinois  
(97) *American Airway*

Hill Aircraft Streamliners  
Cincinnati, Ohio  
(114) *United Airway*

Hurley-Townsend Corporation  
New York City, New York  
(64) *Pan American Airway*

Imperial Brass Mfg. Co.  
Chicago, Illinois  
(104) *Pan American Airway*

Irving Air Chute Company  
Buffalo, New York  
(57) *American Airway*

Jacobs Aircraft Engine Co.  
Camden, New Jersey  
(53) *Transcontinental Airway*

Kendall Refining Company  
Bradford, Pennsylvania  
(28) *Pan American Airway*

Walter Kidde & Company  
New York City, New York  
(112) *Pan American Airway*

Klinner Airplane & Motor Co.  
Glendale, California  
(39) *Transcontinental Airway*

Lycoming Manufacturing Co.  
Williamsport, Pennsylvania  
(31) *American Airway*

Macwhythe Company  
Kenosha, Wisconsin  
(56) *United Airway*

Metallurgical Laboratories  
Philadelphia, Pennsylvania  
(127) *United Airway*

National Air Transport  
Chicago, Illinois  
(149) *Canadian Airway*

Nicholas-Beazley Airplane Co.  
Marshall, Missouri  
(15) *United Airway*

Norma-Hoffman Bearings Co.  
Stamford, Connecticut  
(42) *United Airway*

Pacific Air Transport  
Seattle, Washington  
(149) *Canadian Airway*

Packard Motor Car Company  
Detroit, Michigan  
(76) *United Airway*

Parker Appliance Company  
Cleveland, Ohio  
(103) *Transcontinental Airway*

Pittsburgh Screw & Bolt Co.  
Pittsburgh, Pennsylvania  
(98) *United Airway*

Pratt & Whitney Aircraft Co.  
East Hartford, Connecticut  
(149) *Canadian Airway*

Pyle National Company  
Chicago, Illinois  
(107) *Transcontinental Airway*

John A. Roebing's Sons Co.  
Trenton, New Jersey  
(135) *American Airway*

Roosevelt Field, Inc.  
Garden City, L. I., New York  
(129) *Transcontinental Airway*

Scintilla Magneto Company  
Sidney, New York  
(122) *Pan American Airway*

Shell Petroleum Corporation  
St. Louis, Missouri  
(23) *Ludington Airway*

Skinner Motors, Incorporated  
Detroit, Michigan  
(62) *Pan American Airway*

Sky Specialties Company  
Detroit, Michigan  
(49) *Transcontinental Airway*

Smith Engineering Company  
Cleveland, Ohio  
(62) *United Airway*

Sperry Gyroscope Company  
Brooklyn, New York  
(106) *Pan American Airway*

The Sportsman Pilot  
New York City, New York  
(125) *Transcontinental Airway*

Standard Oil Co. of Indiana  
Chicago, Illinois  
(25) *American Airway*

Stewart Hartshorn Company  
New York City, New York  
(102) *Pan American Airway*

Switlik Parachute & Equip.  
Trenton, New Jersey  
(98) *Pan American Airway*

The Texas Company  
New York City, New York  
(50) *United Airway*

Thompson Aeronautical Corp.  
Detroit, Michigan  
(97) *Transcontinental Airway*

Timken Roller Bearing Co.  
Canton, Ohio  
(101) *American Airway*

Transamerican Airlines Corp.  
Detroit, Michigan  
(97) *Transcontinental Airway*

United American Bosch Corp.  
Springfield, Massachusetts  
(131) *American Airway*

University of Detroit  
Detroit, Michigan  
(34) *United Airway*

Varney Airlines  
San Francisco, California  
(149) *Canadian Airway*

Warner Aircraft Corporation  
Detroit, Michigan  
(61) *Transcontinental Airway*

Wayne County Airport  
Detroit, Michigan  
(110) *United Airway*

Western Electric Company  
New York City, New York  
(113) *American Airway*

Western Flying  
Los Angeles, California  
(37) *Transcontinental Airway*

Westinghouse Electric Co.  
East Pittsburgh, Pennsylvania  
(63) *American Airway*

Westinghouse Lamp Company  
New York City, New York  
(61) *American Airway*

Wright Aeronautical Corp.  
Paterson, New Jersey  
(16) *Transcontinental Airway*

Wyman-Gordon Company  
Worcester, Massachusetts  
(24) *Eastern Airway*

**Miscellaneous**

Post Office  
(126) *United Airway*

U. S. Army Air Corps  
(98) *Transcontinental Airway*

U. S. Dept. of Commerce  
(12) *Eastern Airway*

Press Headquarters  
(16) *Eastern Airway*

Model Air Line Ticket Office  
(15) *Ludington Airway*

Show Manager's Office  
(Center) *Century Airway*

Police Department  
(49) *American Airway*

U. S. Marine Corps  
(53) *American Airway*

# AIR—HOT AND OTHERWISE

“OH, I SAY, C. G. G! ARE YOU THERE?”



Frank A. Tichenor

**I**N its issues of February 17th and 24th and March 2nd, the British publication, "The Aeroplane," devotes much space to that great secret of its editor, C. G. Grey, about how good all English airplanes are, and how bad all other (especially American) airplanes are.

After evidence of this great man's unaccountable dissatisfaction with us and our country about a year ago, we suggested that it might be worth his valuable while to visit the States and look us over. It has been a long time since he's been here. We still seek the honor of a visit from C. G. G. Perhaps a month or two in this "400-year-old country," away from that pall of fog, would prepare him to return to his "1,400-year-old comic islands off the West Coast of Europe" at least interested if not enlightened.

C. G. G. calls us gamblers. Right. And when we win, we shall give out of our winnings to the famine-stricken as we have in days gone by, even though they be in British Ireland, in British India, or even though the famine be in Britain's own war chest, as it was during the World War, starving desperately for loans. There's nothing wrong in borrowing. We've borrowed. But, having borrowed, we do not organize lusty propaganda to convince the lenders that in "forgiveness" of our debts must lie their salvation. So many Britons, of late years, have had this message to deliver to us that they have jostled one another from our platforms as well as their own.

Convinced that we have too much of most things desirable except brains, C. G. G. is sure that there is one thing which we never shall attain. That is, a really great share of the world's airplane trade. We so lack experience, he points out, that nothing really worth while may rightly be expected of us, but, he admits (evidently attributing it to luck), we already have done something. He defines our achievement in the world's commerce as predominance in "the automotive, cycle, safety razors, and the whole line of comic trades."

Obviously he thinks the airplane beyond the bounds of "comic trade," and so do we. Aircraft owes something to Americans; the Wright Brothers invented the airplane, and the activities of the great C. G. G., therefore, are based upon their accomplishment. C. G. G.'s own magazine, "The Aeroplane," is named after the American device; how does he tolerate it?

Lindbergh is another that may be mentioned. There were Curtiss, Byrd, Chamberlin, Post, Hawks, and quite a lot of others who are known to Europeans.

And outside of flying? There is the gold market of the world—England had that once; we have it now.

But "the whole line of comic trades" in which we have succeeded, in accordance with C. G. G.'s admission, really has to some extent importantly included airplane manufacture, sales of which he is so sure that we shall never have a worthwhile share. Both C. G. G. and the leaders of the British airplane industry, being tolerant and measurably

friendly (as we hope they are in spite of the war debts), will be glad to read the following facts and figures gleaned from a reliable source:

Last year we exported just a little less than five million dollars' worth of airplane engines and accessories, about a million dollars' worth more than in 1928. So 1931 set a new high mark for aeronautical exports. Perhaps, if C. G. G. would compare this with the English export figures in the same line for the same year, he might get a thrill, or if not, maybe a chill.

This year we shall do even better. We sold last year, and are selling this year, something aeronautical to practically every country on the globe. Not so bad for the country which he pities with the compassionate remark, "But nowhere is the depression so depressing as it is in the States." Not in aeronautical export, dear C. G. G.

To whom did we export? To C. G. G.'s own England, to Italy, Japan, China, Turkey, every country in South America, Siam, Czechoslovakia, to Serbia and Croatia and to France and even to Germany. Our aeronautical exports to South America have been quite sizeable in spite of the efforts of the world's best salesman, H. R. H., the Prince of Wales.

C. G. G. could learn about our product from His Royal Highness, by the way. While in South America, the Prince was flown in an American plane with an American pilot—and was flown quite safely and efficiently, hugely enjoying the experience and greatly pleasing all of us. Oh, yes, C. G. G., that good American plane was a Sikorsky—you have heard the name before.

We sent about \$1,500,000 worth of American aircraft engines to forty countries; about \$2,000,000 worth of planes to fourteen countries, over some of which the Union Jack floats proudly; \$1,500,000 worth of aircraft parts and accessories to more than seventy countries, including the United Kingdom, British Honduras, British East Africa, British Labrador, British Newfoundland, British Trinidad, British West Indies, British Australia, British Bermuda, and even British England itself. We are equipping Turkish airlines. We have factories to make American planes in Chile and Peru and probably will have others in Latin America.

We're not satisfied with what we're doing. We hope to do much more and better. We're not trying to put England out of the aircraft business. We're not using unfair tactics in order to sell goods. So please stop picking on us, C. G. G. England makes good engines and good planes, and there's business enough for both of us.

Come on across, C. G. G., and get acquainted with us. We'll have an easy chair and a jolly cup of tea for you in our office and the tank of our family Ford filled with "petrol" to take you where the sights are, if you'd rather not chance flying in our "aeroplanes." Cheerio, old fellow!

# ARE PILOTS PROFESSIONAL MEN OR MERELY AERIAL CHAUFFEURS?

Major General James E. Fechet, U. S. Army (Ret.)

**O**F late there has been some confusion of thought about the status of the pilot. There are now so many of them that it will soon be necessary to assign them a definite place in our economic personnel scheme.

In the early days of flying this necessity did not exist. In the first ten years of flying there were only a hundred or so of these "birdmen." It wasn't hard to classify them. Most of them were adventurers who had taken to the air for a thrill. No longer were there wildernesses to conquer, Indians to fight, pirates' flags to follow, but there were still bold, restless, carefree souls, and these eagerly rushed to the airplane as the last remaining vestige of uncertainty.

Here they could flirt with death, play with danger, be fascinated by excitement. Had these early pilots lived in the fifteenth century they would have followed the flag of Columbus or Magellan; in the sixteenth century they would have sailed with Drake or Morgan. Three hundred years later they would have been on the rim of civilization still, following the fortunes of the 49'ers, or riding with "Billy the Kid" or fighting the last ragged remnant of red men.

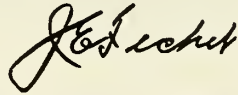
Before the war the airplane pilot was an air vagabond, a flying gypsy. But the war rang down the curtain on that. It was suddenly discovered that these fliers and the machines they coaxed through the air combined to make the most deadly and swiftest military weapon of all time. There was a frenzied panic to turn them out—these airmen and air machines—by the thousands. It was suddenly discovered that the nation which possessed them in the greatest numbers would probably win the war. This changed the pilots' status. Much against their wills they were brought under military control, set to teach others to fly. But we still followed the original idea of picking young madcaps, reckless boys, as possessing that degree of nerve, of the devil-may-care spirit to be air fighters.

Thanks to Elliott Springs, Floyd Gibbons, and some other war writers, a fictional picture of the wartime flier grew up which was quite shocking to your Sunday School teacher and old maid aunt.

As a matter of fact, it fell to my lot to spend the hectic war years in turning out these young fliers—hundreds per day. From what I saw, these young birdmen were neither above nor below the average of young American college manhood. Of course they had spirit, for hadn't we picked the palest and healthiest of the lot? They had courage to

---

**I**T has fallen to my lot to spend much time in close association with flying men. Several times their quick-witted work, cool courage, and accurate judgments have saved my life. I appreciate it. I have seen these men under fire, at play, at work, in every strata of society, and I have yet to be ashamed of their performance. Take it from one who has trained thousands of them, who has lived and flown with them for fifteen long years, the first-class flying man is a professional.



Maj. Gen. U. S. Army (Ret.)

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a high degree and, added to that, they were surcharged with that war spirit which electrified the very air in those never-to-be-forgotten war days.

We had coached this spirit; we had encouraged this frame of mind; we had forged this dauntless weapon to hurl at a dangerous enemy. When the Armistice came there was a terrible let-down. It was not surprising that this high climax of emotion vented itself in some queer ways. I feel that I knew the wartime flier well. He was your boy and your boy's high school and college chum, hand picked for daring, coached in courage, taught to face death with a smile. Only with that kind of a man could we lick that kind of an enemy.

A race of fighting men who inhabit a small section of the globe play a vital part in the arrangement of the political map of the world. What makes these people such deadly warriors is their religion, which teaches them that if they could only contrive to be killed in battle, not only they but all their families would have a sure passport to Heaven. The followers of that heathen fetish have nothing on our wartime fliers. Many of them flew and fought as though they were inviting a violent death as a passport to the soldiers' Valhalla.

When the war was over it took that type of human specimen, the ex-war aviator, a long time to settle down. He did not find a peacetime niche as quickly as his more earthly brother. He had been sailing the skies, touring the heavens, so there is little wonder the mud of earth seemed commonplace.

More than 2,000 remained to man the air arms of the Army and Navy. It's from the ranks of the remaining 3,000 that our mail and airline pilots mainly come.

Should these men be classed as members of a profession, do they constitute a skilled trade, or are they just aerial chauffeurs? To begin with, just what is a profession? What dividing line separates the professional man from the tradesman?

There are the learned professions, such as medicine, law, and the clergy. Many members of these groups do not draw the salaries of members of the union skilled trades, such as stone masons, plasterers, paper hangers, painters, machinists. I take it, therefore, that salary of profit cannot be the segregating medium. It seems to me that education and the time required, plus the cost of acquiring the necessary fundamentals, are more nearly the things which set a profession apart from a (Continued on page 130)

# METAL AIRPLANE CONSTRUCTION

## Part 1 — The Wings

By

Dr. Michael Watter

FOR a proper choice of material it is insufficient to consider only its weight-to-strength ratio, since it is the efficiency of the whole structure that must be achieved in design. Restricting the present articles to purely theoretical engineering considerations (quite apart from the manufacturing and service requirements), types of structures will be reviewed from the standpoint of their suitability for specific parts of the airplane. In this treatment it is still necessary to consider the part as a whole with necessary fitting joints, size, loading, and stress distribution, all of which affect the efficiency of the final design.

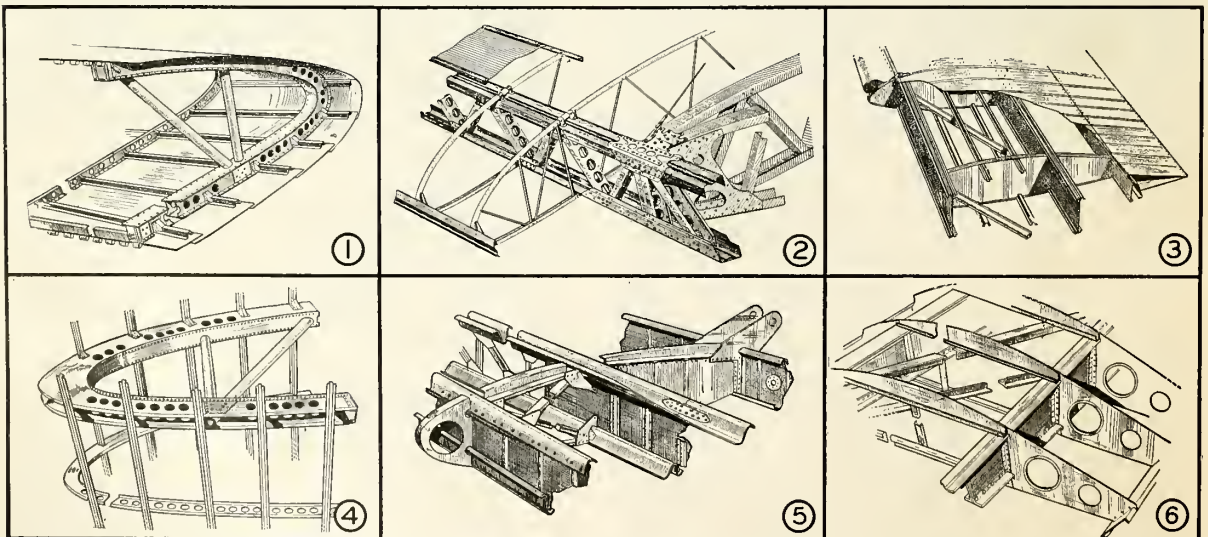
### General Considerations

The following considerations, elementary as they are, warrant attention because of their great importance in the proper arrangement of the structure. Tension and compression are two principal means of transmitting an axial external force, and bending and torsion are the two means of transmitting external couples. Tension permits the most effective use of material, provided connections are suitable for efficient design. In tension neither the form of cross-section nor the length of member is important. Compression, on the other hand, in all practical cases, introduces the importance of form factor and length

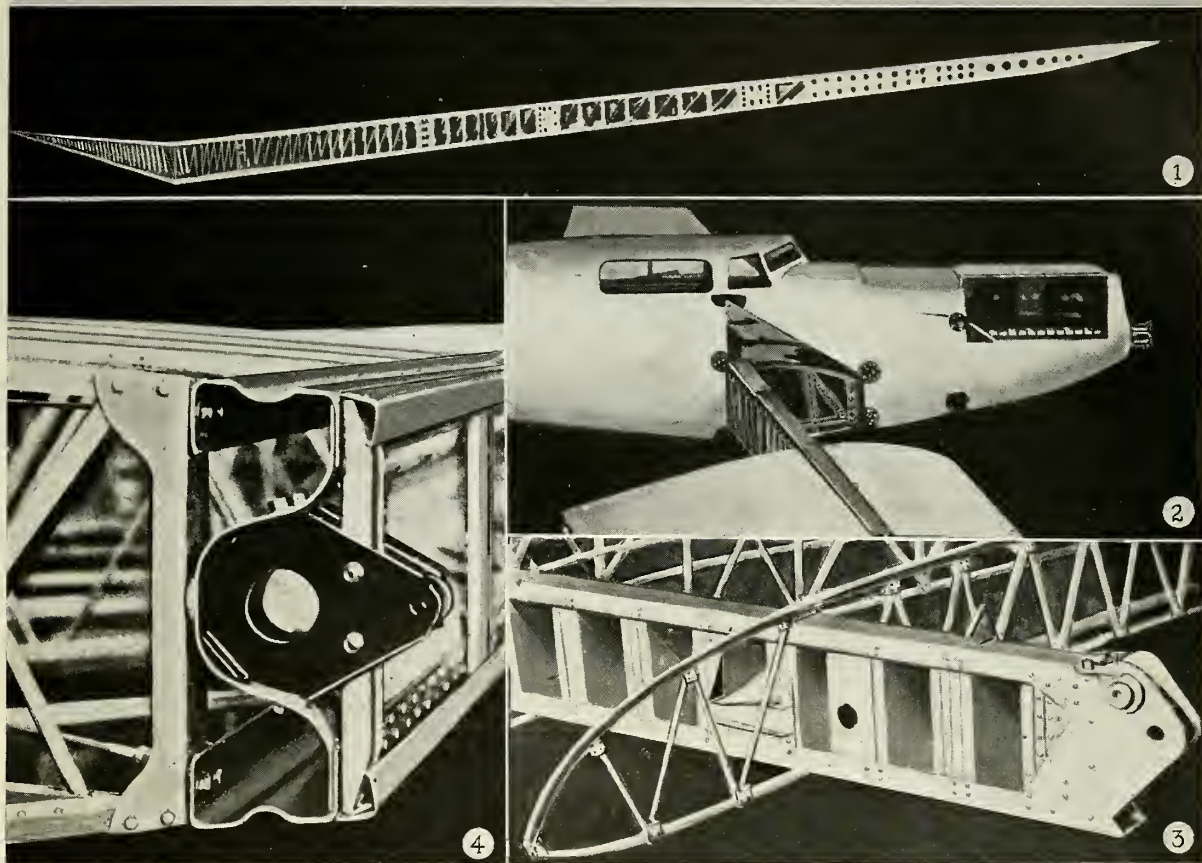
THE subject of metal construction is peculiarly individual, not only from the standpoint of coordination of the specialized theory of airplane structures with its practical application, but also from preferences and prejudices among various designers. The results and findings of accumulated experiences are not sufficiently numerous, and the correlation of facts is too meager, to enable one to draw any general conclusions at this stage of the art. In addition to the purely theoretical difficulties of finding and using a suitable type of metal construction, there are at least two major problems to be considered in the choice of satisfactory structure. Manufacturing difficulties and the question of maintenance must be given equal consideration to arrive at a desirable type of design; the former may not be the same for different concerns, since they depend not only on the materials employed and the type of structure, but to the same degree on availability of suitable shop personnel, equipment, labor cost, number of airplanes to be constructed, etc. No specific recommendations can be made as to the preferable type of construction, as each design must suit engineering, manufacturing, and practical considerations which are too various to enable one to choose any one *ideal* type. In the author's opinion there is no such ideal type, but the designer's aim is to choose merely the *most suitable* type which is individual for different conditions.

of member. In compression the relative efficiency of a member is decreased, because the failure of compression members commonly employed in structures does not occur at the compression yield point of the material but occurs either through the form failure of the cross-section or the member as a whole. In the case of bending, the strength of a member is also affected by the size and properties of cross-section, the length of the member, and the disposition and type of supports. Torsion is still worse than bending because of the introduction of torsional modulus of rigidity, equal to about 0.4 of the modulus of elasticity. In airplane structures a member is seldom subjected to a simple condition of stress, and the problems of combined bending and compression, torsion and bending, and more complex cases, such as torsion, bending, and compression, etc., are very often met with.

An understanding of simple conditions of stress will enable an appreciation of the fact that adding material and



(Sketches from *L'Aeronautique*)  
 (1 and 4) Dewoitine D. 33 leading-edge construction, showing main built-up ribs, formers, transverse channel stringers, and method of skin attachment. (2) Supermarine wing, showing built-up drag compression member. (3) Potez 39 duralumin construction. (5) D.B. 80 three-beam duralumin structure. (6) Wibault two-beam duralumin structure with rigid drag bracing and metal covering.



(1) Dewoitine D. 33 duralumin beam. (2) D. 33 single-beam wing construction, showing fuselage attachment and leading-edge box portion for torsional rigidity. (3) Vickers wandering web duralumin beam with double drag bracing for torsional rigidity. (4) Supermarine wing structure; duralumin beam, stainless steel fittings, and double drag bracing.

(Illustrations from L'Aeronautique and Vickers Co.)

secondary members is not necessarily helpful, and sometimes leads to structures which prove to be heavier and weaker instead of lighter and stronger.

In addition to the problem of the proper type of structure, it is necessary to consider the type of external loading, such as distributed, concentrated, reversible, etc., since it has a bearing on the type of economic structure.

Space limitations do not allow detailed treatment of these fundamental principles of structural design, the thorough comprehension of which is extremely helpful in developing efficient construction.

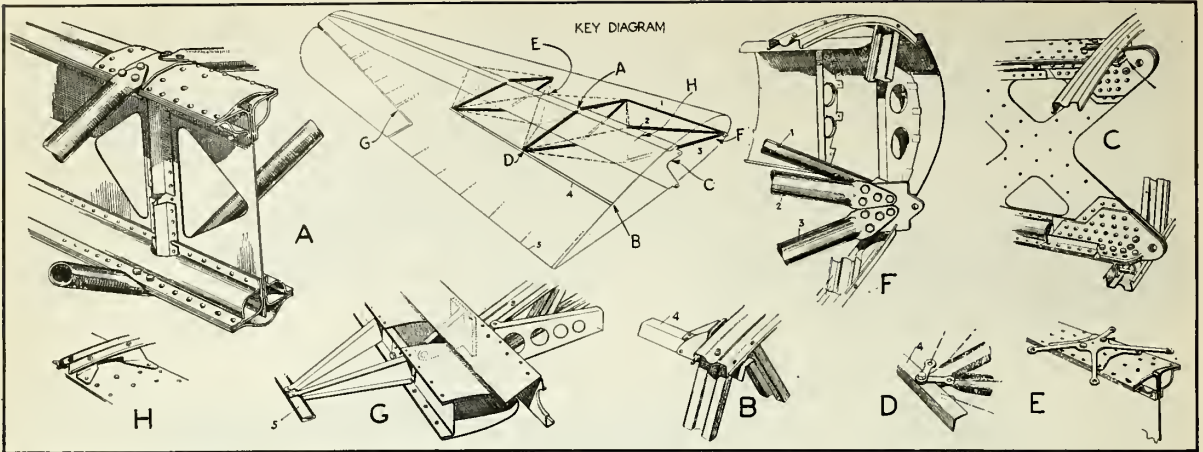
### Wing Construction

Wings, whether monoplane or biplane, represent members loaded principally by transverse loads and couples. Because of the type of bracing often used in airplanes, compression and tension are also introduced, leading to secondary bending.

Considering the nature of outside loading and a typical fabric-covered wing with ribs and beams, it is interesting to follow the way in which the structure transmits the loads. The customary manner of sewing the covering to the ribs is such that the negative pressures acting on the upper surface of the wing are taken in tension through the stitching to the lower chord of the ribs, to which is

added the distributed load from the lower surface, due to the positive pressures. The ribs' reactions are transmitted to the beams, thus loading the latter in bending. In turn, beam reactions are taken at the hinges and wire or strut attachments. When the external bracing makes an angle other than  $90^\circ$  with the axis of the beam, compression or tension is introduced.

Inasmuch as the employment of metal makes it desirable to have few highly-loaded members, it is logical that, particularly in the case of outside braced types of structure, it is best to employ a single beam, sufficiently stiff in torsion to prevent undue deflections and flutter. The same advantages are inherent with a cantilever wing of a small or medium sized airplane. The designer of the monospar wing, H. J. Stieger, took advantage of these features and went further by converting the torsion, through appropriate bracing, into axial loads in auxiliary pyramidal or "spiral" braces and bending in the beam proper. From the standpoint of strength and simplicity, it would seem that a wing structure with ribs and fabric covering and having a properly located single box beam, would be very efficient for a small or medium airplane. Incidentally, such a design offers much more accurate and efficient torsional analysis, necessitating, however, stronger ribs and rib attachments. In a standard two-beam design it is necessary



Details of Stieger monospar construction, showing single beam and spiral bracing. The wing is fabric-covered. (Sketches from *Flight*)

to employ double drag bracing to assure adequate torsional rigidity.

For larger airplanes, and possibly acrobatic and high performance military machines, it may be possible to employ metal covering which would extend up to the rear beam. The beams should be designed as thin web members, since the lateral failure would be effectively prevented by the covering, and bending could be taken without excessive deflections. Covering the trailing portion of the

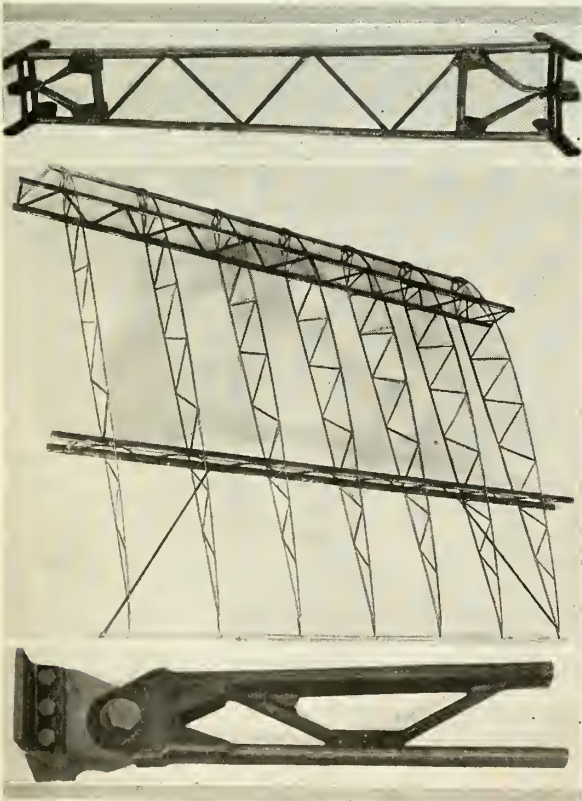
wings with metal would necessarily lead to higher weight, since this portion of the wing at all times carries a light load. Dornier was first to introduce composite metal and cloth covering; while it has certain design complications, it is a good structural compromise. Where metal covering is used, the standard rib design is heavy and expensive, and in order to make structural use of such covering it is necessary to use transverse stiffeners and widely spaced main ribs. The employment of rib formers, possibly intercostal, will result in a higher degree of stiffness of the covering (and consequently of the wing as a whole), preventing early buckling of the covering under load. In very large planes the combination of depth of the ribs and size of the upper and lower surfaces makes it more efficient to design the covering sufficiently stiff to take the distributed air load without employing full depth ribs. The surface is composed of removable portions reinforced by proper trusses of economical depth. This facilitates inspection and allows an efficient use of a two- or three-beam structure. It is possible to design a shell-type monoplane wing with few reinforcements by employing light magnesium alloys, thus being able to utilize the greater bulk with a consequent smaller effect of form factor. The advocates of lighter alloys usually extol the merits of the greater thickness possible with such alloys in their arguments against the use of steel. The argument does not necessarily hold true, however, since there are many ways of transmitting a stress, and if the designer avoids compression and torsion as much as possible and employs heavily-stressed parts, steel has the advantages of simpler connections and greater stiffness. The problem of the most efficient type of structure, however, must always necessarily be a compromise.

### Beams

In the design of beams it is important to distinguish between those which do not carry compression and those in which the outside bracing imposes compression loads. In the former type, it is permissible to allow a higher deflection without the penalty of secondary bending. Furthermore, the beam subjected to compression should have the web designed to transmit compression stress, which often constitutes a high proportion of the total stress.

Beams which do not carry axial compression are preferably single-truss structures or a built-up box where the

(Continued on page 131)



(Top) Built-up duralumin tube compression drag truss member. (Center) Heat-treated chrome molybdenum Warren truss beams and duralumin oval tube ribs. (Bottom) Typical welded wing hinge.

# GUYED TO COMPANY ORGANIZATION

*by Caldwell*

**I**F you six readers have followed my advice and have promoted yourselves an airplane company according to the plan I outlined last month, you are now leaning back, waiting for me to advise you just how to organize your corporation. Also, you are probably marveling at the generosity of a man who presents this plan to you with no further charge than the 35c. you paid for the entire magazine, or only 25c., if you were smart enough to subscribe at the yearly rate.

Well, it's like this: All of the political and financial big-bugs have advanced some constructive plan for bringing back prosperity, so I want to do my part, too. This plan of mine, I believe, is quite as valuable as any that has been advanced from political headquarters, with the further advantage that I'm not even asking you to elect me to a position where I can get my snout in the public treasury. I have no axe to grind, having pawned it last winter.

Now then, the hoofbeats of the bankers and brokers galloping off into the distance die away like a common stock dividend, leaving you, as president of your company, to organize a factory with whatever the bankers and brokers have left you, minus their commissions. If you are an amateur at this sort of thing, you will naturally look about for someone to build airplanes, so we may as well get that detail off our minds first.

That men actually work on airplanes will come as a surprise to many, for of course you seldom hear a word about them and probably conclude that aircraft are built by presidents, vice presidents, and public relations counsels. The truth of the matter is that certain lowly growths, or fungi, called engineers, draftsmen, superintendents, straw bosses, metal workers, welders, carpenters, and painters, perform the only actual labor involved in the creation of an airplane. To do this they are hidden away in a large, drafty building and fed just enough so they won't grow sluggish after lunch and yet will remain alive. It is considered careless management to let any of this crew perish on the premises. They're supposed to go outside to do that.

In a paragraph or so we may sum up these fellows who build the planes and then put them from our minds in favor of the more important matters of organization. The brain work, so-called, is performed by expensively educated men of practically no financial understanding, who are called engineers. They are studious fellows with green eyeshades and convex-lensed glasses. They tend to get dandruff, halitosis, pink toothbrush, and indigestion rather early in life but are so interested in their work that they pay no attention to minor personal afflictions. Usually they come out, or are pushed out, of college, intending to revolutionize aviation, but end up doing stress analysis or detail design. Each one of them treasures at home the design of an airplane that always is better than the one that he is working on for the factory, and which he intends to build some day. Only he never does.

The supervision of the actual labor is done by the fac-

tory superintendent and his assistants, who work very hard at the business of seeing to it that the men in the various departments work even harder. It is their happy duty to see that the place is a perfect hive of industry and that the workers toil with all the ardor of honey bees. Incidentally, they also resemble the bees in this respect: When they have finished an airplane, it is instantly taken away from them, just as honey is taken from the bees. But they never seem to notice their loss and go on making more airplanes until the market is jammed.

In fact, one of the major problems confronting you as a manufacturer is how to stop these engineers, superintendents, and workmen from making airplanes for months after everybody who ever wanted an airplane already has one. The strange fellows work themselves into a perfect frenzy of overproduction, and before you know it, you have hangars and hangars full of unsold airplanes, around which frantic airplane salesmen are observed running in circles and baying at the moon until a thoughtful vice president remembers to cut off their expense accounts.

In fact, the actual designing and building of airplanes is such a simple matter that it safely may be left to these enthusiastic toilers. But what you, as a manufacturer, must see to personally is the organization that controls, or often fails to control, their efforts. That is where you will find this guyed invaluable, for it is taken almost verbatim from the organization chart of one of our largest and noblest pre-panic airplane companies.

First, you may dismiss the stockholders from your consideration, for nobody pays any attention to them. A hospital for visiting stockholders is a kindly thought, for many of them faint when they see what has happened to their money, but after all a hospital is not well regarded by the more hard-boiled promoters, who feel that it borders on the sentimental. Never coddle your stockholders; treat them with the tolerant contempt they deserve and get on to more important matters. Incidentally, pass over the directors, too, after giving each one a cigar and asking him what he thinks of the weather. By the time he has managed to think up an answer you are away, and the weather has changed by then, so the incident is closed.

Brushing the stockholders, directors, and chance insurance and bond salesmen aside, it rapidly becomes evident that your business as president is simply to get things running, and then go out and play golf. You may not especially fancy golf, but you must golf whether you like it or not. All presidents do; it adds tone. And sometimes on a golf links you may meet someone who can be induced to invest money in the factory, especially if you approach him immediately after he has been hit on the head by a well directed drive off the tee. You infest golf courses for social and financial reasons, as well as the elbow exercise at the nineteenth hole. I might as well add that it is useless to attend as a caddy.

*(Continued on page 128)*

# EDITORIALS

## The Aircraft Show

EVERY aircraft show held in Detroit has been a success, and the present one should be, too. Despite business conditions, attendance at automobile shows throughout the country has not fallen off.

Opinion is divided as to which time of the year is most effective for an aircraft show and as to the advisability of exhibiting at Detroit year after year. Similar problems confronted promoters of the early automobile shows, however, and they were satisfactorily worked out by study.

Experience taught motor car manufacturers that their shows should be held in January or February, giving the public opportunity to see and compare the new models and decide on their purchases before the beginning of the real buying season. A similar plan might be a good idea in our industry. For a number of years several manufacturers have been urging the Aeronautical Chamber of Commerce Show Committee to that effect, maintaining that the public will not buy until after it has seen all the new models at the Show. This may be right; the manufacturer who gets his prospects lined up in January and February has more time to sell them before the flying season begins in the North than if he lines them up a month or six weeks later. On the other hand, bad weather, snow, and ice entail high additional cost, and some manufacturers maintain that the cost and hazard in getting their product to a show held so early in the year more than offset whatever advantages may be claimed.

Whether we can pattern our procedure parallel to motor car experience is problematical. Many details wholly differ. Whether, as with motor cars, changed designs and improved engines will promote airplane sales extensively is a moot question. For years car sales were much affected by radically altered designs and new appliances. The self-starter boomed business; additional cylinders boomed business; practically every betterment meant increased sales, people turning in old cars and getting new ones in order to be up-to-date and have cars as good as those owned by the Joneses. Will it be the same with aircraft?

The annual buying capacity of the same aircraft purchasers is yet to be proved, and hints of this power may be determined at these shows. We suggest that every effort be made to analyze all fundamental details of this matter. There is much to be learned about aircraft merchandising, and there is no better school for this instruction than the Annual Aircraft Show. Let this Show serve the purpose for which it is intended.

## Night Passenger Planes

THE continuous, successful expansion of our national and international airways is a strong indication of the bright future awaiting us in all branches of the aircraft industry. Tentative ventures of enthusiastic individuals have grown into a well-organ-

ized, well-equipped, and well-supervised network of airlines. Public response is clearly shown.

The volume and regularity of passenger traffic and the need of night operations should encourage building of large planes where comfort and convenience would be equal to those found in any other means of transportation. American industry is making a commendable effort in this direction and at the present time we have a few specially designed airplanes which will partly fulfill the expanding needs of airlines.

When practically all first-class mail is sent by air (and this is coming sooner than many seem to realize), large airplanes in increasing number will be necessary, and manufacturers should grasp this opportunity to further foster American aviation.

## Aerial Vacations

VACATION by airplane! What more attractive vacation could exist than that of travel by clean, exhilarating means over and away from the troubles of the earth?

Aircraft travel, air mail, and air races have made intelligent people in this country familiar with aeronautics—things of this sort which not so long ago would have seemed fantastic. The increases shown by various air activities may not be the result of coordinated effort in this industry; perhaps they increased despite lack of it.

The potentialities of such vacations are enormous. They would be comparatively not much more expensive than vacations by motor car, boat, or train. The time-saving speed of air travel would enable vacationists, who by train or motor car would find it impossible because of limited time to go far afield, to skim across the continent and have time for pastimes other than the mere rush of travel. The coasts, the Grand Canyon, the magnificent vistas of Canada, quick trips to Cuba and the other Caribbean Islands, to Mexico, Central and South America—all these now are for the first time available for the vacationist who cannot stay too long away from his job. By the air these long trips are made as quickly as short trips by other means of travel. Let the people know that, and the answer will come from them as soon as they have been convinced that flying is not so much greater an accomplishment than operating motor cars, that it is not necessarily especially hazardous, that it is not a luxury for millionaires alone.

Travel promoters should be preparing to make these splendid possibilities generally understood. The industry should be familiarizing the public with the fact that the airlines, for which we have 27,000 miles of airways, reach practically every spot of beauty and delight for all American vacationists, that rates are virtually the same as railroad fares plus Pullman (or less) in some cases, and that private planes can be chartered for parties of three or more at very little in excess of railway fare. Detailed information and tickets on any of the airlines can be secured at any Postal Telegraph office.

Last year many people took to the air for their vacations, and for every person doing this last year, there will be hundreds this year and thousands next year, for once a pleasure traveler has gone by air, the comfort, magnificence of scenery, and efficiency of speed will make of him a confirmed aerial voyager.





*When it's thick over the Sierras*

# ... a **GUIDING HAND**

## **UNITED AIRPORT at Burbank uses Western Electric Radio Telephone ...**

The voice of the dispatcher at Burbank cuts crisply through the fog, "Visibility five miles, ceiling 2000 feet." Reassured, the pilot holds his course, arrives on schedule.

United Airport at Burbank uses a Western Electric No. 10A Transmitter for controlling traffic. With this equipment, the dispatcher gives landing instructions to the planes of the transport companies and to radio equipped private planes. His clear, spoken directions keep traffic moving smoothly.

Western Electric Public Address apparatus also has proved its value at many airports. It delivers orders to ground personnel—distributes announcements—helps to turn rail-birds into flyers.

For details on equipment for *your* field, address Western Electric Company, Dept. 269AD, 195 Broadway, New York.

*See us at the Detroit Air Show—Booths 113-115*



*10A radio telephone transmitter and microphone in manager's office at Burbank. Dispatcher (seen at end of canopy) is giving instructions to pilots through a second microphone.*



*United Airport at Burbank, Cal.*

# **Western Electric\***

## **Aviation Communication and Public Address Systems**



**MADE BY THE MAKERS OF BELL TELEPHONES**

*\*Northern Electric in Canada*

# COMMENTS BY LEADERS OF THE INDUSTRY

MAJOR E. E. ALDRIN  
*Stanavo Specification Board, Inc.*

**D**URING the past year of great economic stress, when aviation as well as other industries had difficulty in holding its own, the major transport companies not only survived but actually went ahead. Another significant fact is that those companies of the industry contributing to basic development work have likewise maintained a relatively sound position.

Any prophecy as to the actual volume of business which may be expected in the immediate future would be inaccurate. At the same time, however, the outlook for the years ahead, when trade resumes its normal level, is definitely encouraging. It is particularly bright for those companies whose investment in the industry's future has been made in engineering research and development work, and who recognize that the progress of the industry rests in the continuance of such work. The ballyhoo and hysteria of a few years ago have not paid dividends.

Manufacturers of aircraft and accessories have directed their efforts towards increased performance and greater economy in operation, and some of the oil refiners have taken an active part in these developments. The engineers of the Stanavo Specification Board, Inc., in cooperation with manufacturers, governmental agencies and laboratories, have developed and made available a number of new fuels and lubricants to keep pace with the most advanced engine developments.

The policy of continuing a costly program of development in the face of a declining market is possible only when supported by the important elements of the industry. In respect to petroleum products, the persistent demands of large users for price concessions will inevitably lead to a break down in the continued improvements in quality heretofore made.

The Stanavo Board is continuing its program of engineering research, believing it essential to the continued advancement of the industry. In addition, the distribution of the products developed is being pushed on a world-wide scale so that uniform high quality fuels and lubricants may be available everywhere.

JOHN S. ALLARD, *President*  
*Curtiss-Wright Flying Service*

**I**T is our opinion that the next few years offer an unparalleled opportunity for concentrated energetic sales effort. The Curtiss-Wright Flying

Service was organized primarily as an aviation sales and service unit, and is the only such organization with nationwide facilities. The company came into existence during the boom period, and was just set up and ready to go when the depression hit. Much of the time in 1930 and 1931 was consequently spent in readjustment and reorganization to meet changed conditions. This accomplished, our entire effort has been directed to sales, and we believe we see some encouraging signs.

In order that we may offer a complete line of airplanes, sales arrangements have been completed with a number of well known airplane manufacturers outside of the Curtiss-Wright group, who produce types of ships not included in the Curtiss-Wright line. Each base also carries a complete assortment of accessories.

Formerly the great bulk of our students took up flying with the idea of getting a job. It soon became evident that there was not enough work to go round, so our efforts were directed towards enrolling students who wanted to learn to fly for pleasure, and were prospects for the purchase of airplanes. As a result our present enrollment, though smaller in number, represents a much higher percentage of potential owners. In February, 1932, the enrollment of new students for flying courses doubled that in any of the preceding six months. The number of students taking mechanical and ground courses has increased correspondingly.

We feel the future holds great promise. The number of passengers who are now riding on the airlines are all future prospects for airplanes, and they are continually spreading the advantages and pleasures of flying.

D. L. BROWN, *President*  
*The Pratt & Whitney Aircraft Co.*

**T**HE curtailed demand for equipment during the past two years in all markets has naturally lead to reduced production schedules. This fact, however, has allowed those manufacturers with sufficient resources to concentrate additional effort toward the development of new and improved models. It is felt that the stimulus thus afforded the manufacturers in the fields of research and experimentation has provided the industry with products definitely superior to current equipment. It is also felt that the appearance on the market of models representing sufficient improve-

ment over former types should produce a certain amount of necessary acceleration to sales.

Working along these lines we have increased the performance of our present models to a point where it is believed they should warrant careful consideration by transport operators contemplating a replacement program and by aircraft manufacturers bringing out new models. In accordance with past practice the additional power now available in our engines has been obtained not through alteration of basic designs but rather through the incorporation in them of refinements and improvements. These latter represent the experience of many million miles of operation flown annually by our engines combined with the results which have been obtained by extensive testing in our own laboratories. In addition, the increased performance is also the result of greater familiarity with the characteristics of large air-cooled power plants by the operators themselves coupled with a wider distribution of satisfactory fuels throughout the country. These factors enable us to allow a greater range of freedom on the part of the user.

All in all it is felt that the experience upon which we have been able to draw has produced power plants definitely higher in performance than previous models. We believe these will fulfill the ever increasing requirements for greater power output from engines whose dependability can be relied upon.

COL. V. E. CLARK, *Vice-President*  
*American Airplane and Engine Corp.*

**O**PERATORS of airplane passenger transport lines are, perforce, making heroic efforts toward reduction of operating costs without corresponding compromise of those standards of safety which have characterized the growth of this industry throughout the Americas.

Constructive readjustment on the part of these operators has produced many interesting developments in both the operating and manufacturing branches of the industry and it is evident that the problems involved have brought about a closer relationship and coordination between the activities which go to make up air transportation.

The service which is now available to the air traveling public over a well established network of air routes throughout the American continents has been established at great cost. Operator and  
*(Continued on following page)*

# Another Year of Progress

## FORD PLANES

FROM the very beginning Ford planes have been engineered to provide the maximum in service and safety with the lowest possible cost. Improvements have been made constantly. At the right are listed some notable refinements of the past year. These further reduce the time required for servicing Ford planes and the cost of maintenance; they increase passenger comfort, ease of operation and plane life.

The fact that no Ford all-metal tri-motored plane has ever worn out proves in itself that initial cost may have little bearing on true economy. Here is further proof of the soundness of Ford engineering principles and manufacturing methods.

At the Ford Aircraft Factory an operator is having mail compartments installed in the wings of sixteen Ford transports of an earlier type. They were purchased on the basis of 2500 hours of service. Each of them has been flown more than 3500 hours. A recent rigid inspection of structures and materials showed that at least 2000 additional hours could be expected from them. It was decided to install the mail compartments—and they could be installed only because of Ford plane construction—so that these transports would be even more profitable for the balance of their service.

Be sure to see the Ford plane exhibit at the National Aircraft Show in Detroit, and you are also cordially invited to visit the Ford Airport and Ford Aircraft Factory.

### NEW FEATURES IN FORD PLANES

Complete accessibility to every working part and to every accessory and important item in the structure is perhaps one of the most interesting developments in Ford plane construction. The engine installations have been "cleaned up"; every attachment can be quickly reached. Larger doors in the ceiling of the cabin provide freer inspection of the wing center section and fuel lines, and permit the fuel tanks to be easily removed. These and other refinements eliminate any such excuse as "it's too hard to get at."

Cabin head room has been increased nine inches. Passengers need not stoop when standing or walking in the aisle. The safety glass windows are now in one piece, and each has a separate easily adjustable ventilator.

A new type of slanting windshield has been developed. It is particularly valuable in night flying because it eliminates glare from beacons that have been passed. It also helps to increase vision in rain or snow.

Semi-balloon tires of very low pressure have been developed which smooth out rough fields and add to passenger comfort during take-off and landing. They are used with aero struts. Their cushioning effect obtains longer life in every part of the plane.

All parts of the metal structure are now treated with zinc chromate and when assembled are sprayed with aluminum lacquer. This finish gives further protection against corrosion, and is as permanent as anything can be.

F O R D M O T O R C O M P A N Y

(Continued from preceding page)  
 manufacturer have spared no reasonable expense in keeping pace with the requirements of this growing industry, which, like all other transportation systems, now finds itself confronted with economical problems affecting all branches of industry.

Operators within the United States apparently feel that, under existing conditions, the maximum revenue is to be expected if airplane fare rates between cities are held down to those established by railroads. Whether this view is sound or not will be determined only by time. Personally, I feel that when proper means have been developed to maintain reliable schedules despite adverse weather conditions the volume of air traffic will show a steady increase even though passengers are charged substantially more than train fare.

At present, however, with low passenger fare rates and the existing average percentage of passenger seats filled, the airplane manufacturer is faced with the problem of providing a safe, comfortable airplane the direct flying cost of which is less than three cents per seat-mile.

Eventually the flying cost per seat-mile will be reduced, through the development of more efficient airplanes, engines and aids to navigation, to such a value that operators can not only pay their overhead expenses, but show a net profit. Let's hasten the day.

**J. R. FITZPATRICK, Vice President**  
*Haskelite Mfg. Co.*

**T**HE aeronautical industry seems to have graduated from "The Ballyhoo" stage. The idea of a plane in everybody's garage has been abandoned and we have reverted to the basic idea that "after you build them—you have to fill them."

Statistics indicate a healthy development in the past few years. In 1931, in the face of a world-wide depression, passenger mileage continued its forward march with a gain of 20 per cent over the previous year. This probably was due to decreased rates, but nevertheless it is a very healthy sign.

Air mail again showed a decided advance, and air express has grown from a few hundred pounds in 1926 to nearly nine hundred thousand pounds last year. I believe that air express is going to have a decided influence on the development of American Aviation.

During the early days of the air mail service with the ten-cent rate we followed the practice of sending all of our correspondence on specially prepared letterheads, using a tissue sheet. This letter was then followed up by a copy on our regular stationery for filing purposes. With the reduction in air mail rates to their present level, we discarded the tissue

letterheads and used our regular bond stock.

The thought has occurred to me that the use of air mail would receive a decided impetus if a plan could be formulated whereby a special rate could be provided for a letter of limited weight.

By reverting again to the tissue letter, using a single sheet and a number six envelope, a letter can be prepared, stamped ready for mailing with a weight of 1/6 of an ounce. Certainly the rates should and could be reduced for such a letter. A much cheaper service can be inaugurated and a corresponding increase in the use of air mail would be reflected immediately in more frequent service and, of course, increased revenue.

**F. TRUBEE DAVISON**  
*Assistant Secretary of War*

**T**O the vast bulk of the American public, the aeronautical industry may be a comparatively small group of organizations manufacturing airplanes, engines, and accessories, but from the standpoint of the Government it is a vital adjunct of our national defenses, because a well-organized, efficient aeronautical industry is a component part of aerial preparedness. Until all nations lay down their arms, we must possess an air force that is ready to fly and fight when the first cloud of war appears on the horizon and capable of expansion to meet any emergency.

To be assured that such an air force will be available and ready to operate efficiently, we are dependent to a great extent upon the efficiency and sufficiency of our aeronautical industry.

Military aviation is advancing with such rapidity that the Air Corps is not able to take advantage of the opportunity afforded other branches of the Army to put aside, in time of peace, considerable quantities of equipment. In the onward rush of flight, the fastest pursuit plane of today is a museum-piece tomorrow.

In other words, were we to accumulate a large reserve of aeronautical material we would find ourselves, at the outbreak of war, burdened with obsolete aircraft as useful against more up-to-date equipment as an archer matched against a tank. Consequently, we must provide, in time of peace, engineering development that insures steady progress and an aeronautical industry able to meet the Nation's demands for planes and equipment in event of war.

But our aims in that direction must be adjusted to the economic situation. Maintaining the integrity of the credit of the United States is fundamentally important to all business, including aviation. One step to that end is the reduction of military expenditures along lines consistent with the preservation of the vital structure of national defense.

**R. E. GILLMOR,**

*Vice President and General Manager*  
*Sperry Gyroscope Company, Inc.*

**F**ROM the point of view of the instrument manufacturer, the greatest need of aviation in general is the development of simple and effective means to enable transport and mail planes to maintain flying schedules in any kind of weather. This involves the development of instruments and other accessories which will permit the airplanes to safely take off, fly, and land under any condition of wind or visibility.

Our limited observations of airplane passenger psychology have brought us to the conclusion that (1) saving of time is the principal reason for the choice of the airplane as a means of transport, (2) if, through failure to maintain schedules, the traveler finds himself unable to consistently save time, he will not use the airplane, (3) the average airplane passenger would have no fear of flying or landing under conditions of bad visibility if he were assured that this could be done with a reasonable degree of safety.

We believe, therefore, that not only would the traveling public accept fog flying, but that the ability consistently to maintain flight schedules in bad weather would greatly increase the volume of air passenger traffic.

The instruments now available make it possible to take off and fly under any conditions of visibility. It remains to develop means for safely finding the airport and landing in fog. We believe this to be one of the most important problems now before the aviation industry.

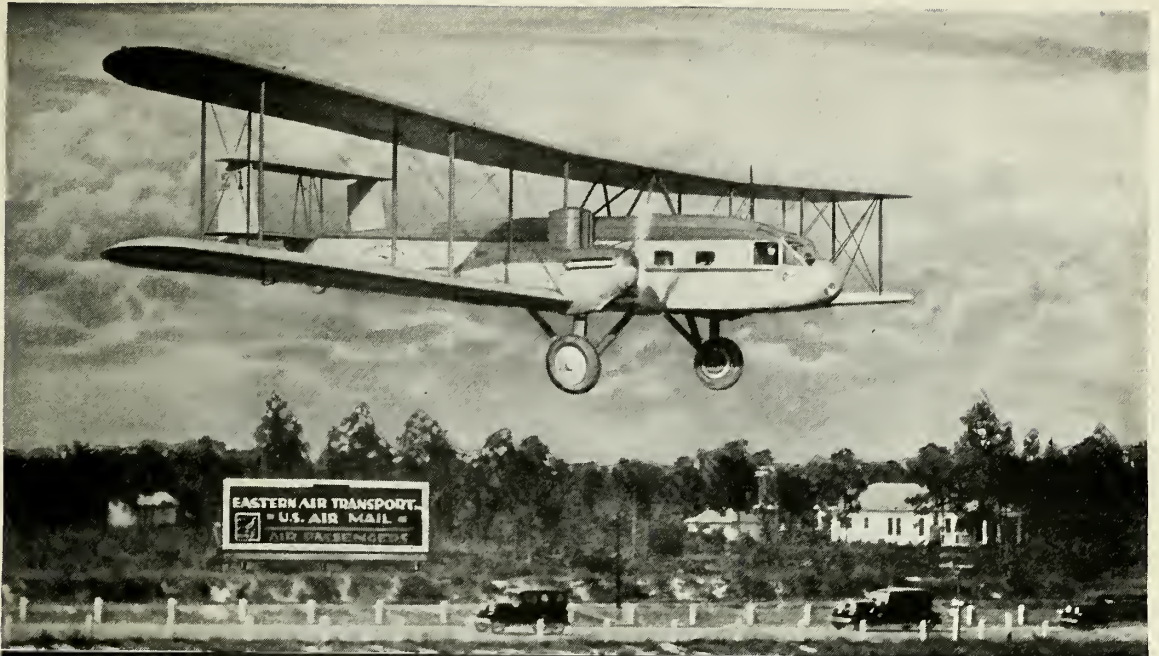
**IRVING GLOVER**  
*Second Assistant Postmaster General*

**I**N the early days of the Air Mail Service when we were all pioneers, not only the Operators but the Department as well, during the calendar year 1926, there were 1,841,225 miles of service flown over thirteen air mail routes whereas, on January 1, 1932, there were twenty-three routes which carried 9,102,375 pounds of air mail during the calendar year of 1931, and the mileage flown for that year amounted to 28,281,042 miles.

And I believe the record of performance, and the service rendered the patrons of the Air Mail Service, will be even far greater in the calendar year 1932 than in any previous year.

Not only is the Department proud of the record of mail carried by air but, more especially, do we take pride in the number of passengers carried by the authorized air mail lines of the United States. To be exact, there were 215,891 persons flown on contract air mail lines in this country in the year 1931.

(Continued on following page)



“We have been greatly impressed with the reliability and endurance of Goodrich Silvertowns..”

H. A. ELLIOTT, *Vice-President & General Manager, Eastern Air Transport, Inc.*

FROM New York to Miami, Eastern Air Transport's fleet of forty-four planes makes daily scheduled stops at twenty-six Atlantic seaboard cities. Frequent take-offs and landings on all types of fields, and wide variations in climatic conditions make this service particularly hard on tire equipment.

Commenting on the performance of Goodrich Silvertowns, Mr. H. A. Elliott, Vice-President and General Manager, wrote recently —

*“We have been greatly impressed with the reliability and endurance of Goodrich*

*Silvertown Airplane Tires in use on our planes. We appreciate the cooperation that has been shown by Goodrich in its constant efforts to develop and improve the type of tires used in air transport service.”*

On any plane, *Low Pressure Silvertowns* make take-offs and landings safer . . . easier. In any size they afford the highest quality with minimum weight. A set of *Low Pressure Tires* can be quickly and easily installed on your plane, with or without brakes. See your nearest Goodrich Distributor, or write to the Aeronautical Division of The B. F. Goodrich Rubber Co., Akron, Ohio, or Pacific Goodrich Rubber Co., Los Angeles, California.



**QUICK FACTS ABOUT EASTERN AIR TRANSPORT.** E.A.T.'s system is 2,876 miles long . . . Most of this route is lighted for night flying with airports every 30 miles . . . The forty-four planes in E.A.T. service include 6 nine-ton, eighteen-passenger Condors like the one pictured above . . . The operation covers 12,544 miles daily.

# Goodrich *Airplane* Tires

Another B. F. Goodrich Product



Over 40 rubber products for airplanes: Silvertown Tires • Tail Wheels  
Hose • Tubing • Engine Mounts • Crash Pads • Matting • Accessories

(Continued from preceding page)

Looking forward to the year 1932 and prophesying as to the probable air mail poundage, I am certain that it will far exceed that of 1931 by millions of pounds and, with an upturn in business, it would not surprise the Department to see, at least, one and one-half million pounds of mail being carried by air each month. And as a prediction regarding the number of passengers that will be transported over the contract air mail lines during the present year, I believe upwards of one million is a conservative estimate.

The great increase in the efficiency of the Air Mail Operators, the on-timeness of their schedules, and, too, the greater degree of safety provided, will absolutely compel the continual growth of the passenger factor on the operated lines. This, of course, will hold true as to the increase in the use of air mail. The element of time saved will always be considered by the business-man.

The air mail, however, is not ready to stand on "its own" as yet. Congress, through its appropriations, will necessarily have to support the Post Office Department in the aid which is being extended to the service until such time as normal business in the carrying of passengers and express alone will support the Air Companies. This day will come and it is not far off either. One has but to look at what is happening to our air mail lines to Central and South America. Due to the tremendous increase in the mail, north and southbound, over these lines, they are fast approaching the stage where the income from postage alone will take care of the seven million dollars appropriated for that service this year.

There are, as yet, several important lines to be placed in the picture and as well, at least, a half dozen very important feeder lines to be added to the great trunk systems now established, and as many lesser feeder lines. Considerable thought has been given to the establishment of several seasonal, lines which might prove to be very important feeder lines to some trunk lines.

#### CAPTAIN FRANK M. HAWKS

##### *Aeronautical Adviser, The Texas Company*

**W**HEN we think of speed in aviation—and we needs must think of it often, since it is obviously our chief stock-in-trade—we encounter three decided advantages of fast flight: Safety, economy, and comfort.

To fly fast does not mean to fly dangerously. In fact, presupposing proper maintenance of equipment and careful planning, speed makes for safety. In the necessarily "cleaned up" design of a fast airplane there are less parts to go wrong; the less time a plane is in the air, proportionately the shorter the period for accident; the faster the plane the quicker

it can beat weather—by skirting it more efficiently than the planes now commonly used or by completing a flight from point to point before bad weather, which might be predicted for the destination, sets in.

It is cheaper to fly fast. Speed designs, of course, are built with an eye to a minimum of parasitic resistance—the effort being to achieve a maximum of horsepower with a minimum of weight and frontal area, and a maximum of lift over drag. Outside "plumbing," awkwardly adding to resistance in many of the planes now in use, in new designs is being streamlined or placed inside; structural strength is being obtained without the former amount of exposed carpentry, and engines through the medium of supercharging are producing more power without increase of size or weight. It is not correct, of course, to compare all airplanes against it, but my J-6-E Wright-powered Texaco 13 Travel Air Mystery S illustrates the point in a way. Compared with thousands of small and moderately sized ships, the Texaco 13 cruises at 190-200 miles an hour with a horsepower of 475, and although its load is necessarily small because it is somewhat an experimental craft. But the cleanliness of the design and the volume of power for comparatively little weight and frontal area, means that I complete a flight in almost half the time required by some other ships and I burn only a little more gas and oil.

Speed means comfort. It doesn't take a passenger, and pilots for that matter, very long to become fidgety in a long flight in an airplane cruising in the neighborhood of 100 or 125 miles an hour. The cockpit doesn't get any softer the longer you sit in it and your gear any easier to wear, but step up the speed of the ship and all this is decreased in direct ratio to the increase in miles per hour. But more than that, yes, considerably more than that: Speed does more to relieve the isolation of airports from its irritation than all the waiting rooms and administration quarters and other such facilities that we can make available. If you visualize a flight between any two large cities of the country, you've got to add about two hours for transportation from the field to town to the hours required for the flight. If we have aircraft that can land us in the heart of a community, the very features by which the craft obtains this landing cut down its flying speed and the advantage of landing in town is lost in the air and the ultimate result is no better than if we landed on the airport, of course, usually several miles outside the city. But if we can cut a four-hour flight to two, the two hours for ground travel isn't going to be so irritating. Therein, I think, we will have offered a rather fancy advantage to the air traveler.

#### ROBERT INSLEY, Vice President *Continental Aircraft Engine Co.*

**S**ALES in these dolorous days are made by industrious salesmen to people who can afford to buy (including air transport companies). We may reasonably hope that improvement in sales effectiveness plus the normal increase in air travel converts will offset the reduction in prospects' per capita cash value and that 1932 commercial business in dollars and cents will equal that of 1931. But if it does, what then? 99.9% of the aircraft enterprises in 1931 wrote their net results in red ink and the others used black ink furnished by the Government. With two political parties competing in budget-balancing promises, with military appropriations absorbing the brunt of the shock, and with an aircraft industry still capitalized and organized for a market many times larger than any possible commercial demand, it seems obvious that 1932 promises us yet a strenuous belt-tightening process. It is not weakness to subtract cost plus overhead from sales value in advance and reach a result. Nor is it disloyalty to our common cause to face a perfectly transparent situation honestly and apply what we all know to be the obvious corrective measures. In aeronautical circles it seems to be generally disregarded, but it is nevertheless an inescapable fact that we shall never have a sound condition in the aircraft industry or anywhere else until we spend less than we earn. Our habits of writing off operating losses as development expenses and looking only to the future for returns on aeronautical investments have about seen their day.

#### P. G. JOHNSON, President

##### *United Air Lines and Boeing Airplane Co.*

**I**F we interpret the figures of the Aviation industry for 1931 in relation to the unbridled enthusiasm of a few years ago, it is evident that we are now face-to-face with practical situations which should guide the manufacturing and operating sides of aeronautics into a period of careful planning and prudent management.

Production of airplanes and engines in the United States last year, with an estimated value of \$32,000,000, was fifteen per cent greater than in 1927, but eighty-eight per cent less than in 1928 and 139 per cent less than in 1929. In 1931 airplane production fell off 300 units from the previous year and it is estimated that twenty-five per cent of the planes manufactured last year remain unsold in factories. Stated another way, the production of planes in the United States last year was substantially the same as in 1926.

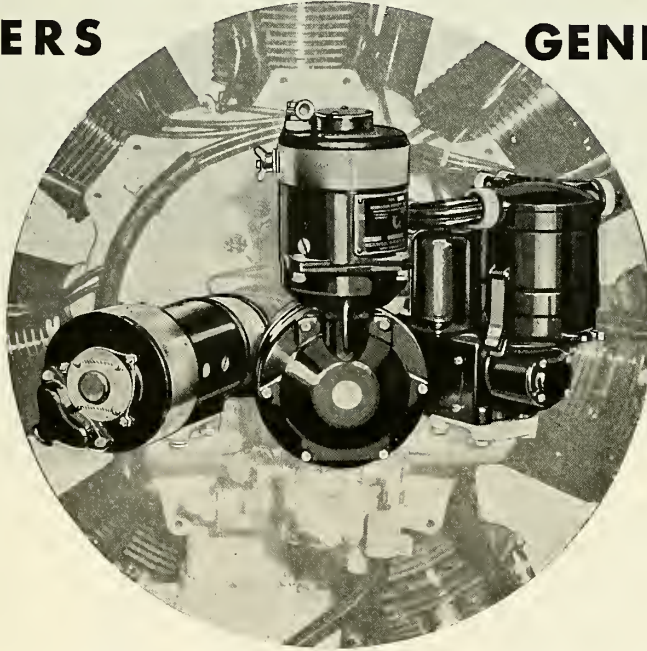
It is apparent now that the day of mass production of airplanes is not just around the corner and that the long anticipated

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# now! BATTERY IGNITION

**STARTERS**

**GENERATORS**



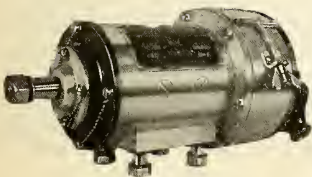
## for smaller aircraft engines

The coordinated engineering organizations of several units of the Bendix Aviation Corporation have been engaged for some time in developing battery ignition equipment for aircraft engines.

As a result thereof, Delco Aviation Ignition is now offered as companion equipment to Eclipse Starters and Generators—especially in combinations particularly suited to the requirements of smaller aircraft engines.



Delco Aviation Ignition Unit



Eclipse Aviation Generator

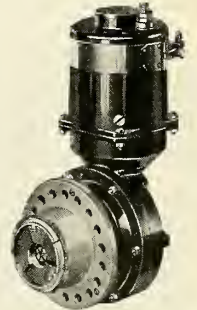
### **DELCO AVIATION IGNITION**

Manufactured by  
Scintilla Magneto Co., Inc.  
Sidney, N. Y.

(Subsidiaries Bendix Aviation Corporation)

### **ECLIPSE STARTERS · GENERATORS**

Manufactured by  
Eclipse Aviation Corporation,  
East Orange, N. J.



Eclipse direct cranking electric starter, type Y-150, for engines up to 450 cu. in. piston displacement.

(Continued from preceding page)

market for planes sold individual owners will be forthcoming only after a substantial part of our population is convinced of the utility of the airplane by the education obtained in riding in planes operated on regular schedule. This being true, the airplane plants of the United States must look largely to the military and transport and flying school outlets for planes.

The market for commercial aircraft has been disappointing to many who were too optimistic as to the period of time required to introduce the airplane into our national plan of transportation and communication. We are confronted with the problem of making heavy expenditures in research and engineering and for obsolescence at a time the public has not yet accepted the airplane to the point of bringing it into general usage. Coupled with that situation is the necessity for manufacturers and operators of airplanes to undertake the heavy expense which always goes with pioneering any new form of transportation.

I do not desire to paint a doleful picture, but those in the industry should realize that the so-called "Gold Rush Days" are over and that we are down to hard pan. Those who invested funds in the industry, and it is estimated there is about \$350,000,000 now invested, have a right to expect the same type of prudent management which is found in other industries not touched by the romance of a boom period.

One of the bright sides of the picture is the progress made by commercial air transport during the year.

**C. S. JONES, Vice President  
Curtiss-Wright Corporation**

**T**HERE are so many conflicting and confusing problems in aviation that it is difficult to separate and analyze them. It is apparent that the two principal markets during the next two years will be the military and the transport. Our Air Force ranks fourth or fifth among the nations of the world. Six

years ago a programme was laid down outlining the requirements over a five-year period, and our present strength is far below this authorized programme. Certainly nothing has happened during this time to lessen the value of the airplane as a weapon of war; in fact, subsequent events and improvements have rather increased its potentialities. During the last two years, with the falling off of the commercial market, much of our engineering talent has been devoted to the creation of new military designs that show an increase in performance greater than that obtained in any similar period since the war. Most of this development in machines and motors has been perfected at the expense of the manufacturers, while similar development abroad has been paid for by foreign governments. The only way our manufacturers can get this money back is through adequate production orders from the Government at fair prices. Such a policy would bring our Air Service up to strength, place it on a par with other nations, with equipment at least equal in performance. It has been the laudable purpose of the Government purchasing officers to buy as cheaply as possible. In many cases contractors have taken orders on which they have lost huge sums in order to keep their factories running, and such a policy, carried too far, will ultimately defeat its own purpose. The manufacturer is entitled to a fair profit, provided his business is efficiently run and his product is good, and the Government is entitled to the best product at a fair price. An efficient and adequate aircraft industry is a necessary adjunct to our national defense. It would seem that with a little closer cooperation most of these problems could be worked out, and their successful solution would result favorably to all concerned.

In the commercial field the manufacturers and designers are confronted with the necessity of creating new transport that will best fit the growing needs of the operators. Patronage on the airlines, even in these bad times, has increased

consistently and promises to assume large proportions. Costs should decrease as volume increases, but it is evident that the passenger of today will pay little more to fly than he will to travel by other means. Machines must be created which will carry him as fast as possible for the price he will pay, and still give the operator a profit.

The air mail contracts are another knotty problem. Regular operators claim that they will lose money if further reductions in rates are made, while certain independents who started their lines recently with their eye on mail contracts offer to carry it at reduced figures. Again probably a compromise is the answer. The older operators had to go through an expensive period of pioneering to which the newer aspirants were not subjected, and yet they can probably profit from their own experience and by adopting some of the methods of the newcomers.

Government support is still necessary and will be until there is a far greater volume of business than there is today.

Comparatively speaking, the private market has been negligible, during the last few years. With more people flying, however, with reduced prices of planes and intelligent sales effort, this market should be developed so as eventually to become the most important. Closer cooperation between interested factions, a mutual effort in solving the various problems, a united front on the part of the entire industry in selling the public on the benefits and pleasures of flying would seem a worthy platform for 1932.

**TEMPLE N. JOYCE, Vice President and  
General Manager, B/J Aircraft Corp.**

**W**ITH all of the intensive growth of aviation between 1926-29, there was relatively little aerodynamic advancement. Apparently manufacturers of commercial planes depended upon the development in engine design for their increases in performance because this was easier and cheaper than

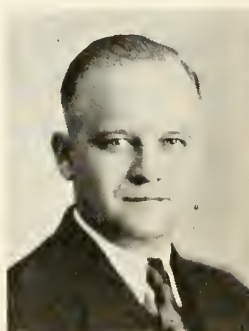
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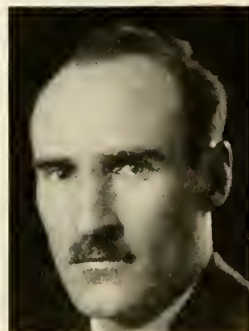
F. Trubee Davison



Frank Hawks



P. G. Johnson



C. S. (Casey) Jones

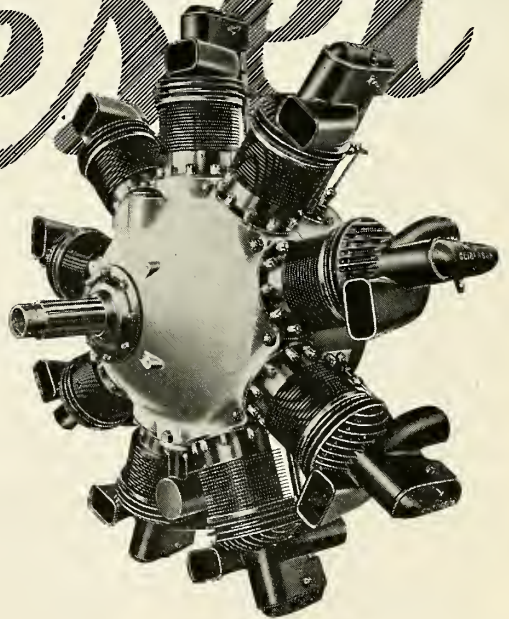


# Announcing

# AVIATION'S FIRST *free wheeling* ENGINE

## THE GUIBERSON

# *Aero-* Diesel



Granted Approved Type Certificate No. 79 by U. S. Department of Commerce in February, 1932 . . . Perfected after extensive research and experiment . . . Backed by a grand old name among manufacturers of equipment for the Oil Industry . . . Manufacture in commercial quantities soon to begin.

**OUTSTANDING FEATURES:** 1. One-throttle control, automatically synchronizing timing and fuel injection. 2. Complete decompression allowing "free wheeling" of propeller with motor dead. No diving to re-start motor. 3. Operation at fuel cost of one cent per mile. 4. Elimination of fire hazard. 5. No radio interference. 6. Simplicity.

ON DISPLAY AT THE  
**NATIONAL AIRCRAFT SHOW**

BOOTHS 27, 28, 29 and 30 at intersection of  
Transcontinental and Western and United Airways

THE GUIBERSON DIESEL ENGINE COMPANY, DALLAS TEXAS

# GUIBERSON

*Aero-*  *Diesel*

(Continued from preceding page)

assuming the high experimental cost necessary for aerodynamic research. As more horsepower was added, with its increase in gas consumption and gross weight of structure, landing speeds were stepped up with the consequent decrease in safety. Such practices seriously handicapped the sale of private aircraft.

The financial reaction that set in in 1929 has eliminated many purely productive organizations, and by confining the industry to those companies capable of making real aerodynamic contributions, it should be expected that airplane designers will produce real achievements.

Increases in structural efficiency of even large magnitude will not increase the total over-all efficiency of the airplane insofar as pay load is concerned, and great improvements from a standpoint of maximum lift must be made. They may be expected in the nature of boundary layer control, slots, and some type of adjustable flap of variable area and camber arrangement.

The landing of an airplane has always been the stumbling block in air operation. From a commercial transport aspect it should be improved. From a private operating standpoint it is imperative that the dependence upon a human element necessary to bring a plane back to earth be reduced to the very minimum. Excellent work is being done by several companies who have disclosed developments that bid fair to decrease materially the hazards of high landing speed, and the N.A.C.A. has done fine work along the lines of automatic landing studies.

In the past, engine designers have been too prone to create their models with the sole idea of getting the maximum number of horsepower for the minimum pounds of weight. Aerodynamic influences must be taken into consideration by the engine designers, either wilfully or forced upon them by the demands of the operator through the airplane designers. The double row radial development now in progress, and possibly some form of completely cowled engine with forced fed air cooling, will be the next looked for improvements. Large sums of money will be necessary for this experimental research but is the only answer to the demand for more air transport that is safer and at the same time more efficient.

W. WALLACE KELLETT

*President, Kellett Aircraft Corp.*

WHILE the aircraft industry is suffering from the effects of the nation-wide economic depression, it is nevertheless benefitting by the elimination of a good many influences which have been unhealthy rather than sound. If this condition can be maintained and the efforts of the industry

bent toward operating air transport lines on the most efficient basis possible and manufacturing suitable types of aircraft to meet the demands of the public, Army and Navy, the aviation business will be stabilized and stand on its own feet for exactly what it is worth, just as every business should do.

All types of aircraft constructed and all forms of air transport operations must be for one single purpose—to meet an economic need—and no type of “ballyhooing,” high-pressure salesmanship, or propaganda can do more than stimulate temporarily an artificial interest.

If those engaged in the industry will keep this in mind—not try at exorbitant cost to force aircraft or air transportation upon the purchasers of these commodities—the industry will attain a sound basis and remain there until these principles are departed from.

Aviation has been given more whole-hearted public support—more free advertising—and more sympathetic boosting from people of high and low degree than any industry. Aviation people should give thanks for all of this and remember that the public wants aviation just as much as aviation wants and needs the public's dollars. It should, therefore, be sold to them on an honest basis for just what it is worth, but not with promises which aircraft cannot fulfill.

P. W. LITCHFIELD, *President*  
*Goodyear-Zeppelin Corp.*

THE last decade has seen a race for speed in trans-Atlantic travel with England, Germany, France, Italy, and the United States engaged. We believe that the Zeppelin-type airship can offer effective support to the American Merchant Marine.

Speed is costly. It costs twice as much to build a 28-knot steamship as it does to build a 21-knot ship. A 30-knot ship would cost \$30,000,000, and any further speeds are all but prohibitive in cost.

But, while it costs millions to get even ten per cent more speed from steamships, we can step up the speed 150 per cent by using airships—and at a fraction of the cost.

In the belief that a few very fast airships will build up additional business for the slower-going passenger and freight liners, through expediting business contacts over the oceans, and bringing American producers closer to export markets, the three American-owned steamship lines now plying the Pacific have associated themselves with the passenger airship project.

In Germany, the Hamburg-American Steamship Line is one of Dr. Hugo Eckener's active backers in his plans for a trans-Atlantic airship line.

In the effort to reestablish American Merchant Marine, we have given sub-

stantial legislative help to the steamships. Only American ships—American built, owned, operated, may ply in coastwise trade, whether along the two oceans, or between domestic ports of the Great Lakes. Foreign competition is forbidden.

We cannot give this protection to American vessels in international trade in travel between this country and foreign ports; that business is open to all nations. And so the Government gives mail contracts to steamships, endeavoring to assist them to meet operating costs and so hold their place against the competition of foreign ships, which cost less to build and less to operate.

American steamships range in speed from fourteen knots up to the Leviathan's twenty-four knots. Consequently, airships, having a speed of seventy knots, would strengthen America's position as a carrying nation, supplementing the steamships.

In the McNary and Crosser Bills, Congress has before it legislation designed to encourage American capital to engage in the building and operating of airships. Excepting the ship loan feature, which is omitted, these bills pick up, word for word, the legislation which Congress has enacted in the past to encourage American capital to build and operate steamships.

The bills give legal standing to the airship, fix its liabilities, and authorize it to carry mail on the same basis as steamships now do.

This country is in a strategic position to initiate airship transportation over the Atlantic and Pacific. Exclusive possession of helium gas, exhaustive construction and operating experience, manufacturing facilities, and favorable sites for terminals are all important national assets.

The hundreds of successful flights made by the *Los Angeles* and *Graf Zeppelin* indicate that well built and well flown airships will have an important role in expediting transoceanic transport.

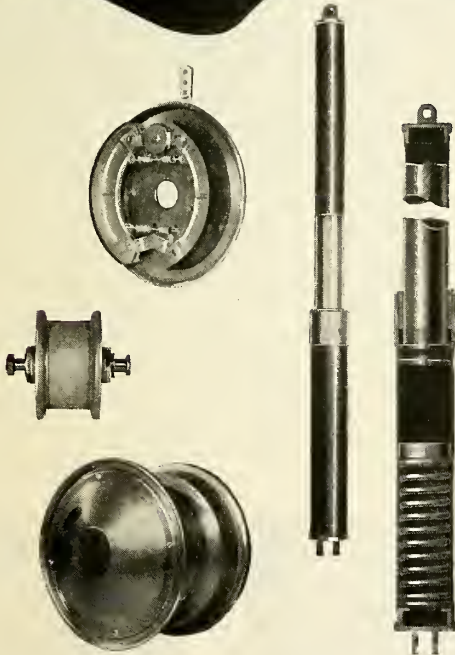
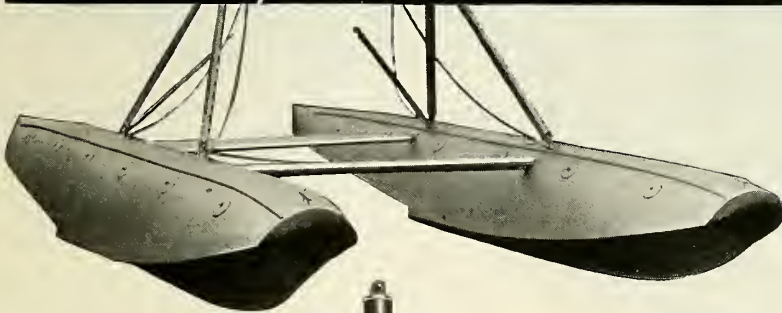
Our studies, however, have revealed very plainly that capital can be secured to utilize these advantages only after such legislation as these two bills provide has been passed.

ALVAN MACAULEY, *President*  
*Packard Motor Car Company*

THE past year has been marked by unusual interest on the part of several governments in Europe in Diesel engines for aircraft. Germany, France, Italy, Czechoslovakia, Yugoslavia, Roumania, Spain, and Portugal have all apparently taken the view that the Diesel engine must be reckoned with in the air. Its various advantages are becoming well known.

This interest has not been of an engineering nature only, but production plans  
(Continued on following page)

# Announcing A SERIES OF NEW PRODUCTS by WARNER



With the acquisition of the Aircraft Products Corporation, Warner now produces along with the well-known Warner "Scarab" Engines a complete new line of aircraft parts.

Warner's plant facilities are comparable to any in the entire industry. The consolidation of the two companies therefore makes an ideal set-up from the standpoint of both production and sales.

In addition to the 7 Cylinder, 110 H. P., and the 5 Cylinder, 90 H. P., Warner "Scarab" Engines, we are now in a position to furnish to the industry the following products:

Airplane Wheels and Brakes; Axles and complete Under Carriages; Oilhydraulic Shock Struts, Tail Wheel Assemblies; Airplane Skis; Pontoons; Flying Boat Hulls; and Wing Tip Floats.

Reflected in all of these various products is the experience gained in engine building practice. Precision workmanship of a high order enters into every phase of Warner construction.

We will also design and build, or build from your own design, various other parts and special fittings.

We will welcome your inquiries.

**WARNER AIRCRAFT CORPORATION**  
DETROIT, MICHIGAN



# WARNER "Scarab" ENGINES

(Continued from preceding page)  
are involved and production will be started during the current year. This was done after exhaustive government tests conducted with the assistance of Packard engineers that were sent to Europe for the purpose.

The fact that only a 225-H. P. engine has been available has been a considerable handicap in the introduction of Diesel engines, but larger engines will surely be developed and will be found much more useful in our commercial airplanes. Likewise, the European companies that are licensed and are to be licensed will undoubtedly build larger sizes which should do much towards advancing the Diesel aircraft engine during the next year. The rapidity of its advance will of course depend very largely upon the degree of improvement in general business conditions.

**HON. WM. P. MacCRACKEN, Jr.**

*Former Asst. Secretary of Commerce*

**A**MONG the several important problems of a legal and legislative nature with which the aircraft industry is presented, one of the most important is the legislation pending before Congress, known as the "Merchant Airship Bills." There are two of these—one introduced by Senator McNary of Oregon, and the other by Congressman Cresser of Ohio.

While there are some differences between the two bills, their purposes are identical; namely, to provide the legal foundation upon which to build and operate a fleet of merchant airships in foreign commerce.

The airship industry in the United States represents an investment of many millions of dollars on the part of private capital, as well as on the part of municipal authorities and the Federal Government. While these expenditures have been made primarily as part of our national defense, all those who have even a slight knowledge of lighter-than-air operations realize that their really potential usefulness is primarily in the

field of transoceanic commercial service.

The United States is in a very favorable position to take advantage of this new means of transportation, by reason of its extensive coastline and important centers on both the Atlantic and Pacific oceans. In addition, the United States has a practical monopoly of helium. While it is true that the *Graf Zeppelin* has operated successfully using hydrogen, Dr. Eckener has frequently stated that he would gladly abandon hydrogen for the more expensive helium, if he were assured a source of supply. Notwithstanding the handicaps imposed upon his operations by the use of hydrogen, he has scheduled ten round trips for the *Graf Zeppelin* between Friedrichshafen and Brazil, beginning in the spring and extending through the summer, and is proceeding to build an even larger airship incorporating improvements made possible by the experience gained in operating the *Graf*.

Although the United States Navy has successfully operated the *Los Angeles* for seven or eight years, and has recently put into operation the *U.S.S. Akron*, which is admittedly the world's largest airship, and will within the next year have in commission the *U.S.S. Macon*, sister ship to the *Akron*, there has not been a commercial airship built in the United States capable of transoceanic service. This has not been due to lack of capital, or lack of faith on the part of the industry, but solely to the lack of action on the part of Congress.

There are two reasons which make it imperative that action be taken by the present Congress. The first is that with the completion of the *Macon*, the airship building industry will be disbanded, unless there is legislation which will warrant private capital in placing an order for a commercial airship. The second is that, though lacking many of the natural advantages with which the United States is endowed, Germany today leads the world in commercial airship development, and every year we delay will permit them to increase their lead.

**WM. B. MAYO**

*Airplane Division, Ford Motor Company*

**O**FTEN I am asked such questions as "How is aviation getting on?", "Do you really believe it is going to amount to something big?" "Have you the same faith in it as ever?"

To all of these questions I have one pertinent answer—The operating record of 1931 shows there were more passengers, mail, and express flown in 1931 than in 1930; more flown in 1930 than in 1929; less money lost in 1931 than in any previous year and a reasonable profit made by several operating lines.

Can you find any other method of transportation that has a similar record?

With these facts in mind, nothing more is needed to assure the future of aviation. Its future growth is, of course, pretty much dependent on the foresight and "go-to-it-ness" of those in the industry. We have proved that the public will ride and that we can get good loads at railroad plus pullman fares. In my opinion it will not be many years before the airlines will carry practically all first-class passengers for trips of 200 miles and longer. The rapidity that this is brought about is entirely in the hands of the operating airlines.

Since the airplane era the railroads have attempted to speed up their important trains to bring back, if possible, some of the travel they have lost. This, to my way of thinking, is the wrong way to go about it, as trains are now running quite near their maximum top limit, so the increased speed adds considerably to the hazard and expense.

It is utterly impossible for railroads to fight air travel speeds, as airlines can double or treble their present speeds with no extra hazard and with only the additional costs for the extra speed.

The cost of air travel is gradually being reduced, principally due to the fact that planes and motors are having a much longer life than was first anticipated. In many cases the original depreciation costs have been cut in two.

(Continued on following page)



Temple N. Joyce



Hon. W. P. MacCracken, Jr.



Wm. B. Mayo



Oliver L. Parks



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FORMANCE**

**1931**

Kendall wins 6 times as many prize awards as all other oils combined at National Air Races (Cleveland).

Kendall used in World's Long Distance Non-Stop Flight by Boardman & Polando (New York to Istanbul, Turkey, 5011.8 miles).

Kendall Wins First Place in Ford Reliability Tour **FOURTH** Consecutive Year.

**1930**

84.2% of All Prize Winners at National Air Races (Chicago) used Kendall Oil.

**1929**

80% of All Prize Winners in National Air Races at Cleveland used Kendall Oil.

**1928**

In New York to Los Angeles Derby over 60% of those who finished in all classes used Kendall Oil.

In the Los Angeles to Cincinnati Derby—*all finishers* in Class A used Kendall Oil.

*... and 30 hours flying  
between drains prove*  
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Made from Bradford Grade of Pennsylvania Crude, the finest in the world... specially refined by extra Kendall processes—this accounts for Kendall's extraordinary performance and economy. You can get Kendall at all principal airports.

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(Continued from preceding page)

This, together with many other savings gained by experience and the lowering of all prices since the depression, has aided in getting the costs down to a point where the operator has a good chance to operate at a profit.

The aircraft industry is, of course, entirely dependent on the success of the operating airlines; and while it is true that the operator is dependent on the manufacturer for equipment, I feel reasonably sure that the manufacturer will be fully able to cope with any reasonable demand.

I believe that as soon as business returns to normal aviation is destined for a great push ahead.

**ADMIRAL W. A. MOFFETT**  
*Chief of Bureau of Aeronautics*

**T**HE five-year programs of the Army and Navy were initiated partly for the purpose of enabling this industry to become thoroughly established by providing from military sources a regular and even flow of construction. It was believed in 1926 that in five years the demand for civil airplanes would increase sufficiently to provide the bulk of new business. That this result has not been attained is primarily due to the economic depression. During the past year the Army and Navy have provided funds for two-thirds of the total construction of new airplanes.

The business boom in 1927 and 1928 caused the establishment of a great many new plants for building airplanes and engines. When the depression arrived, so many manufacturers were in business that the competition between them became so intense as to depress prices too low for well-managed firms to make a profit, and practically all have sustained large losses during the year.

Technical development of Naval aviation has been invaluable, not only to the Navy, but also to the aeronautical industry as well. The studies, research work, and experimentation which the Navy has made for its own use have in almost all cases been held non-confidential and have been published for the benefit of the industry.

The aircraft industry is a vital factor in the national defense of the country.

**OLIVER L. PARKS**  
*President, Parks Air College*

**T**HE kind of man who could make a connection in the aviation industry as a pilot two years ago with the qualifications required at that time is absolutely inadequately prepared to meet the problems of the present day. It is up to the school to lay the foundation that will permit the continued and careful cultivation of characteristics, habits and training that will make the new type of pilot meet today's demands

for safety, skill, and executive ability.

Highly skilled technicians and pilots in the aviation industry will receive a premium for their services during the next three or four years. During this period of time, thousands of young men will decide that aviation is the field for them as a vocation, but hundreds of these men will be too late to receive the real results.

Well-trained and thoroughly competent pilots with the proper amount of instrument experience, men of good, sound judgment who have been trained as business executives, will receive distinguished recognition, both with reference to ability and income, and I think that the majority of the hit-and-miss-trained type of transport pilots will either receive additional executive training or revert back to their original industries.

It is my belief that within five years' time, all first-class passengers will be transported by air. I am firm in my conviction and belief that all first-class mail will ultimately be carried by air. This means immense increases in air passenger travel, stimulated activity in all branches of commerce, and simultaneously the building of an immense reserve of men and machines for national defense.

The time has come when serious consideration must be given to the inauguration of an all-mail-by-air service or mail system whereby all non-local first-class mail can be carried by airplane, saving the Post Office Department millions of dollars. The installation of the system would provide jobs for thousands of pilots and mechanics. It would increase the size of the aviation industry enormously. It would necessitate building thousands of new planes and providing bigger and better airports. The consumption of fuel and oil would be greatly increased.

**F. B. RENTSCHLER, President**  
*United Aircraft & Transport Corp.*

**T**HE trend toward stability in the aircraft industry as in other businesses continues to progress. Throughout the recent period of depression it has been necessary to enforce a most rigid sort of economy which has had and will continue to have a beneficial effect on our organizations. Many of the useless mushroom growths have been weeded out, leaving the field open to legitimate enterprise. The companies which remain have undergone a definite seasoning process which will promote a more mature outlook throughout the entire industry.

Manufacturing activities on reduced schedules have brought about plant consolidations to promote the interests of a general retrenchment policy. In most cases a considerable reduction in inventories has taken place. Naval and

military purchases continue to provide the industry with its largest outlet. It is anticipated, however, that within a short time commercial buying for air transport replacements will begin to come in. The air carriers have demonstrated their ability to adjust themselves to conditions and still show increases in all forms of traffic, indicating the economic value of their services.

Private flying operations as yet do not appear to hold much promise for any sort of a substantial market. Unfavorable foreign exchange coupled with unsettled trade conditions throughout the world have tended to minimize export possibilities for the present, though it is believed that the field will offer greater opportunities after much of the widespread social and political disturbances work themselves out.

**T. CLAUDE RYAN, President**  
*T. C. Ryan Flying School*

**W**ITH five years of costly and valuable experience behind the aeronautical industry, it is well to take stock of present tendencies in order to realize the logical market and needs which aviation can fill today and begin to take profits from its investment. At no time has a survey of the industry and the public shown a more optimistic outlook than is reached after a survey of latest aviation statistics. The fact that many of the aeronautical companies have ceased to exist, have lost their identity through mergers with other concerns, or that millions of dollars have been expended, merely proves again that aviation is fundamentally beset with the same problems and possibilities which have confronted other major industries in their beginnings.

In the past possibly too much stress has been laid by schools in endeavoring to interest future pilots in obtaining a position in the business. These positions of course will be the inevitable result of a growing industry, but the industry must look to its growth through the popularization of flying among people whose sole objective is not a job. The sale of automobiles is not confined to men and women who want a job in the automobile business. Yet hundreds of thousands of positions have been created in the automobile business through its popularization and sale of automobiles to purchasers for pleasure use or as an asset in the conduct of their already established activity.

Statistics show the advantage of thorough training. Whether a pilot intends to fly for business or pleasure he should be aware of the fact that a transport pilot's license, or its equivalent in experience, is advisable. Schools which make a business of the training of students should stress this type of training and

(Continued on following page)

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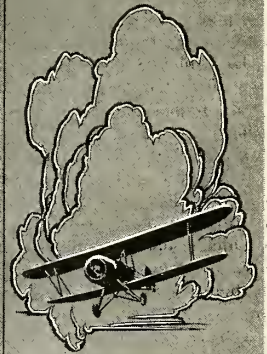
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(Continued from preceding page)  
provide all facilities whereby the student can come to the school and in a concentrated period of time gain the knowledge which would otherwise be carried out over several months or years.

Greater attention must be devoted to the popularization of flying through sales rooms where ships can be attractively displayed and service maintained to such a degree that the business man purchaser will realize that he does not necessarily have to be an experienced mechanic himself in order to derive full pleasure and safety at minimum cost in the upkeep of his ship.

**RICHARD W. ROBBINS, President**  
*Transcontinental & Western Air, Inc.*

WO vitally important problems now confront the air transport operators.

One concerns regularity of service. We must improve performance and reduce to a negligible minimum the number of cancelled flights. When a third or a fourth of the trip scheduled over a certain period is canceled because of bad weather, the operators not only lose a proportionate amount of revenue—they destroy the public confidence. What the public demands is dependability gauged by completed continuous operations between point of departure and destination. And public confidence is the one thing remaining to make a really big thing of air transportation.

During the last twelve months the responsible airline organizations have made considerable progress in maintaining schedules. Radio telephone has been developed to a point where it is a practical and effective means of communication from plane to ground and ground to plane. Weather reporting and forecasting is improving steadily. We have reached the stage where we know just about what kind of weather lies ahead of us. And yet, however, this advance knowledge does not let us take passengers through bad weather. And that is our chief problem today. Better instruments and more knowledge of how to use them—in other words, “instrument flying”—may let us maintain schedules through short stretches of thick weather. But only continuous technical improvement of planes, engines, and instruments will eventually let us compete with surface transport in regularity of service. Admittedly, we must train pilots in the infallible use of new devices; we must keep the rest of our operations personnel thoroughly trained and 100 per cent efficient in the maintenance of equipment. All that is the operators' job. We recognize it. We are spending huge amounts in training, experimenting with and developing such new devices, over and above the Government requirements, that we may derive the maximum efficiency from the latest equipment.

But the public and the public officials do not always take that into consideration. Some of them speak from indifference; others, I fear, through sheer ignorance; but the fact remains that they do speak, and their remarks are critical of the operators. For instance, the charge has been made, and it has received wide circulation, that the airline operators are manufacturers of equipment and are selling equipment to themselves. The intimation is that this condition is retarding development, that the operators are not providing the best service. In the first place, there is no reason to suspect that the operators are not procuring the best equipment possible. And, too, it isn't true that they are selling to themselves. We actually are buying planes and engines from our competitors. Other transport companies are doing the same thing; and that brings me to another major problem before the operators.

The development of airplanes from now on must be economically sound. We have long since found out what physical forces cause an airplane to fly. These have been measured and tabulated. Although we have struggled with figures and methods without end, we have not yet been able to find any possible means whereby the income from airline operations, without the aid of subvention, can be made to exceed the operating costs. This is a fundamental problem. Perhaps it is the greatest one before the aviation industry today. It must be solved, and the only solution seems to lie in the performance characteristics of the airplanes themselves. We can cut the operating costs of present airplanes just so far and still maintain necessary safety factors. If, after determining the maximum possible revenue which our equipment can return, a red figure still persists, the industry cannot be considered on a healthy basis.

Operators and manufacturers must join hands in a coordinated drive to secure airplanes specially adapted to air transport, which by virtue of their speed, pay load, dependability and low operating cost will definitely permit operations at a net profit and independent of government aid. It seems that the achievement of this end depends on the perseverance and ingenuity of our aeronautical engineers.

**I. H. SHEARER, Sales Manager**  
*Kendall Refining Company*

**L**IKE all other lines in industry, aviation is confronted with a need for greater volume. With conditions as they are at present, the Aviation Industry must look more to business concerns than to the individual for their market.

Beyond any doubt the individual is sold and wants to fly his own plane but not enough are financially able to do so and, therefore, more concerns must be taught the idea of using planes for aug-

menting and assisting in sales promotion.

There are many concerns that would be interested in the plan of using planes for this type of work and a basis worked out to show that more good-will, more publicity and sales can be secured and more territory covered by intelligent planning in this manner than can be secured on a dollar and cents basis by any other method.

These concerns are not going to come to you to hear your story; they must be sold the idea.

**WILLIAM B. STOUT**  
*Stout Engineering Laboratories*

**W**ITH all of the pessimism in many quarters regarding the future of aviation and business in general, there seems to be more pessimism about business in general than about aviation itself. Of all industries, flying still holds the business appeal and is still continuing to give a real service that has resulted in an increase during the period of depression rather than decrease. Outside of racketeering this seems to be the only business which has prospered to a large percentage during the slump. The big question now is: Where are we going from here? In my opinion there has been no period in the history of flying when there was so much opportunity as there is right now. We have proved that aviation is a business; that people will fly, and that there is a definite demand for air transports. We have proved also that planes will fly reliably and safely.

From now on our problem is that of making flying pay a dividend. Once we get airplanes down to a cost basis where they can be operated on a real profit, you will see an enlargement of airline and inter-city transport work on many times the basis of the motor truck or bus. You will see passengers carried for less than railroad fares, and even at bus fares, and still with a profit for the operator. These things will come through vision and hard work, but aviation is here, and here to stay.

Meanwhile, let us remember that commercial aviation is a thing by itself, not concerned with military aviation, with air mail budgets or government subsidies, but only with excellent business management as concerns these divisions and the relation to industry, with industry as the fundamental.

**GEO. H. TOWNSEND, President**  
*Hurley Townsend Corp.*

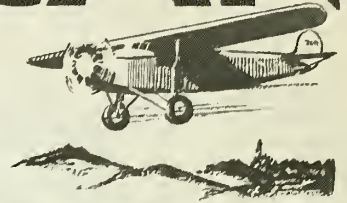
**A**FTER spending nearly twenty years directing a motor car accessory business I have cast my lot with the aircraft business because anything capable of faster and faster transportation is bound to succeed in the end, but it's also bound to have a lot of growing pains in reaching that end.

(Continued on following page)



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(Continued from preceding page)

It is the practice with airlines to remove, reset and reinstall spark plugs every thirty hours. A conservative survey of the cost of this simple operation in labor alone is 10 cents per plug, or \$1.80 per engine every thirty hours, or practically once a week.

To summarize—a yearly bill of \$90 per engine, \$9,000 for one hundred engines, or 6% on \$150,000 invested capital.

Able purchasing agents use their wiles for lower first costs, but, after all, the first costs are largely dependent upon flying hours without removals, and total flying hours obtainable per plug, for it is obvious that if two spark plugs are of the same first cost the plug giving twice as many flying hours will reduce its first cost by exactly half in dollars and cents.

Efficiency experts are usually a thorn in all organizations but I sincerely believe that if transport operators would take a few lessons from them, that they would keep and scrutinize their log books with more care for the elimination of a host of minor items of operating expense which might be found to contain the chemical reaction of changing red ink into black.

**GUY W. VAUGHAN, President,  
Wright Aeronautical Corporation**

**W**ITH 80% of aircraft manufacturing business in the United States today dependent upon government appropriations, the pending drastic cuts in the Naval and Military procurement appropriations cannot but make a situation which is already precarious into a situation which may easily become impossible.

The effects on the potential aircraft producing capacity of the U. S. from the foregoing causes are too well understood to require repetition here. A factor which is of far greater potential importance that is not nearly so well understood is the effect of the curtailment of *production* of aircraft on the normal course of engineering development. There can be no strong self-supporting civil aircraft industry in the U. S. that can maintain itself on a self-supporting basis until such

time as continued engineering development has made possible a reduction in cost of operation to the point where the airplane can offer transportation on a paying basis at prices commensurate with those of other high speed forms of transportation on the ground.

The problem is not so much of finding ways to build a given airplane or engine cheaper. It is rather one of finding a way to so increase the overall mechanical efficiency of the airplane that the percentage of pay load that may be carried with a given weight of airplane is greater than it is today. Speaking specifically of the matter of engines, there is far more reduction in overall operating costs to be gained through finding means to increase the reliable power output of a given airplane engine without materially increasing the weight than is to be gained through mere reductions in the cost of manufacture of a given engine without decrease in weight per horsepower.

It seems necessary for all of us to keep reminding ourselves that what the airplane operator really needs is not *cheaper* engines. What he needs is more reliable, more efficient power output with *less* engine. We can make any given engine *cheaper* by increasing its weight (or by decreasing its power output, which amounts to the same thing), but it is a fallacy to assume that such a course will lead to cheaper overall transportation costs.

The basic development work necessary to realize increases in overall efficiency requires the expenditure of large sums of money in advanced research and experimental work. Governments abroad have realized this condition and have been in recent years as a matter of national policy redoubling their experimental expenditures through such special appropriations as government appropriations for the Schneider Cup Races, etc.

Development in this country in recent years has been rapid, but the major portion of experimental development work in recent years has been paid for, not by direct experimental government appropriations, but through revenue received from *production* of aircraft, plus contributions

by the many stockholders who have had faith in the ultimate success of the industry as a profitable venture. It is true that in this year's budget the purely experimental appropriations for the Army and Navy have been maintained on a level with previous years, and one may conclude therefrom that experimental work can continue as it has continued in the past. This is a dangerously false delusion. When the fact is realized that the very rapid engineering development that has been going on in this country in recent years has been paid for, not by direct government "experimental" appropriations, but indirectly in far greater measure through revenues from production of so-called service types plus contributions by optimistic stockholders; when it is realized that discouragement on the part of disillusioned capital is causing serious withdrawals of capital from our aircraft industry; when it is realized that we are facing a situation where the already slim *production* of recent years gives evidence of being cut almost in half; when it is realized that specific experimental appropriations of the government have in reality covered only a small fraction of the expense of the rapid development in recent years, it must become clear that notwithstanding that the direct experimental appropriations of the Army and Navy have not been reduced, the *total* funds available for advanced development work are rapidly shrinking, and that the inevitable consequence must be a slowing down of basic development work.

If we are to have a real self-supporting civil aircraft industry, development must continue at a rapid pace for some years to come—the more rapid the development, the sooner will come a sound civil aircraft industry. We are facing a situation where, if present projected government budgets become a fact, the opportunity for profit will become even more remote, and still further withdrawals of private capital must ensue. It definitely appears that our industry must curtail its development—and this at a time when other nations of the world

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F. B. Rentschler



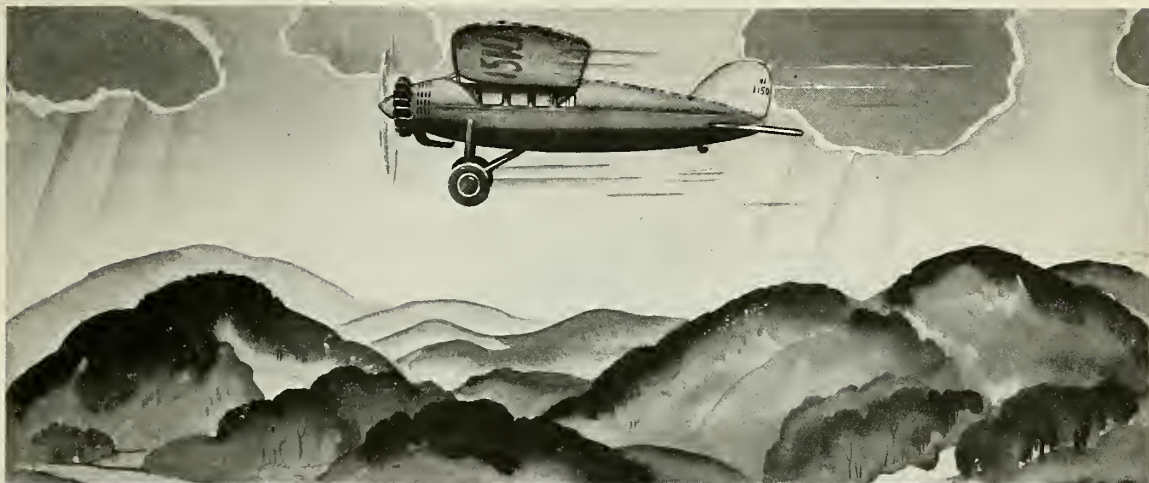
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# NATIONAL-SHELBY AIRCRAFT TUBING

(Continued from preceding page)  
are apparently redoubling their experimental efforts. This is a situation which must concern not only the Army, Navy and Post Office Department, not only the principal military contractors, not only the few remaining civil aircraft manufacturers, but also civil air transport companies everywhere and every one of the thousands of individual stockholders throughout the United States.

**H. E. YOUNG, General Commercial Engineer, Western Electric Company**

**I** FEEL the aviation industry has met its crucial test and proved its economic value in its ability not necessarily to weather the present economic situation, but in spite of a general downward trend of industry, to show an upward curve for the past twelve months.

The place of the air transport industry has an essential part in our everyday life and is becoming more and more appreciated. It is particularly encouraging to note that air transport operators and aircraft manufacturers are not marking time, but are actively engaged in plans for more efficient flying equipment, and are going ahead with work not on a theoretical but on a practical basis. The substantial economies effected in operation during the past year show that this infant industry is benefiting by experience of past enterprises to stabilize its financial structure.

The air transport operators have not overlooked an opportunity of bettering their operations by various technical improvements which have been developed recently. This farsighted policy of not standing by until the last drop of blood is obtained from a unit of apparatus materially shortens the interval of the experimental stage and assures the industry of reliable and cheaper equipment at an early date.

Within the space of less than two years, practically without exception, transport operators have purchased and installed two-way radiotelephone. Their cooperation in this matter now reflects itself in substantial savings in operation, betterment of schedules and has effectively removed the feeling of isolation and helplessness which was a deterring factor to many prospective air passengers in the use of air transportation.

This also applies to the appreciation of the air transport operators of the aids to navigation installed and operated by the Department of Commerce.

Reflecting business conditions the field of private plane ownership and operation has not expanded in keeping with the other activities of the air industry. However, with any upward trend the prospective purchaser will find that the aircraft which he will buy and fly, the service which he will be able to command at airports throughout the country, as

well as the equipment both on the ground and in the plane for guiding him on his aerial journey has progressed. This, in my estimation, means that undoubtedly the aircraft industry once even a small revival of industrial activity is felt will be one of the first to reap dividends on the work which has been accomplished in the last year.



**Col. Clarence M. Young**

**COL. CLARENCE M. YOUNG, Assistant Secretary of Commerce for Aeronautics**

**R**EGULATION of those airlines which carry passengers for hire in interstate commerce is a responsibility of the Aeronautics Branch of the Department of Commerce. As virtually all of the existing airlines in this country cross state borders and offer passenger service, this regulatory activity has a general application.

In formulating the airline regulations, the Aeronautics Branch of the Department of Commerce drew upon its experience gained in regulating aeronautics through licensing of airmen, approval and licensing of aircraft and enforcement of air traffic rules. Only such requirements as were considered essential from the safety standpoint were adopted, for it has always been the policy of the Department of Commerce to avoid any stipulations or restrictions which would have a tendency unnecessarily to hamper the normal and sound growth of the industry.

All scheduled interstate air passenger services are conducted under Department of Commerce Regulations which have been promulgated for this specific type of service and which stipulate that each such service shall operate under a certificate of authority from the Secretary of Commerce. These Regulations require that aircraft shall be properly adaptable to the nature of the service involved and carry a suitable reserve supply of fuel; that airmen shall be fully competent in all phases of the operation; that airways and air navigation facilities (including intermediate landing fields, beacon lights, weather service, radio, and other aids)

on routes operated shall be approved by the Department; that there be a satisfactory, adequate and properly qualified ground organization; and that maintenance of equipment be conducted in accordance with accepted standards and practices.

As conditions change it doubtless will be desirable to revise the regulations in certain respects. Some changes are contemplated as this is written, and proposed amendments have been drawn up and made available to airline operators for study and comment.

One of these amendments would provide for a special rating for transport pilots who are engaged in scheduled operation of interstate passenger air transport service under a Certificate of Authority. This amendment would be inserted in the basic Air Commerce Regulations along with requirements for airmen's licenses but it applies, of course, to the work of the airlines. At present, transport pilots are rated for ability to fly airplanes of various classifications, the classifications being based upon weights. If the new amendment is adopted, an additional rating will be available to the transport pilot, a scheduled air transport rating. To qualify for it he would be required to have had 1,200 hours of solo flying and at least 75 hours of night flying, and also would be asked to pass additional examinations.

Another amendment relates to the Regulations Governing Scheduled Operation of Interstate Air Passenger Services. It would permit airline craft to fly over the top of clouds or fog, provided the plane carries directional radio and weather broadcasting receivers, and provided also that there will be sufficient visibility for a landing at the destination. This can apply, of course, only on routes where radio directional and communications stations are in operation. The amendment provides also that under certain specified conditions the 500-foot minimum altitude rule may be waived. This means, briefly, that an aircraft may fly temporarily at less than 500 feet in order to get to more favorable weather ahead if conditions are such that it is not unsafe to fly at the lower altitude.

These changes have been proposed in order to keep the regulations abreast of developments in the industry. The stricter requirements for scheduled air transport pilots reflect the general policy of air transport companies to accept only pilots who are men of sufficient experience and unquestioned judgment. The proposal to change the rulings with regard to over-top flying and minimum flight altitudes recognizes the fact that aircraft are increasingly more efficient, and that adequate aids to air navigation are now in general use along most of the important aerial routes in the United States.



### Standard Features

Greatly increased speed . . . high powered performance, greatly increased economy . . . completely streamlined . . . greater safety . . . more inherently stable than any previous Stinson . . . larger, roomier insulated cabin . . . V-type windshield . . . shatter-proof safety glass windows . . . electric starter . . . adjustable metal propeller . . . self-energizing brakes . . . hydraulic shock absorbers . . . cabin heaters . . . ventilators . . . parking brakes . . . adjustable stabilizer . . . pants or fender pants optional on all wheels . . . navigation lights, map pockets, ash receivers, assist cords . . . dual wheel controls . . . speed cowl ring on motor . . . cruising speed 110 miles per hour at 1800 revolutions . . . high speed 130 miles per hour . . . rate of climb, loaded, 675 feet per minute . . . cruising range 400 miles . . . gas capacity 56 gallons . . . ceiling, loaded, 13,000 feet . . . wing spread, 43 feet 3 inches . . . length, overall, 25 feet 10 inches . . . capacity, four persons and baggage.

**\$5595** f. o. f. Wayne, Mich.

Equipment other than standard, extra

## Judge Airplane Values By This Yardstick

There is no mystery about how to measure the value of an airplane. The same common sense rules that apply in measuring other products are applicable to airplanes. Careful analysis proves that the ideal airplane is the one which offers the greatest degree of Safety, Economy, Stability, Speed, Comfort, and Beauty at the lowest first cost and thereafter at the lowest cost per mile. Stinson does not offer one advantage at the expense of others but is designed and built to be the best COMBINATION of ALL the factors that constitute airplane value. Regardless of price, we believe the new Stinson Model R offers the best combination of all the vital qualities that has ever been

produced. We invite you to fly it and convince yourself that it is marvelously stable; that any normal person can fly it safely; that it will land and take off in small fields; that its reliable 215 H.P. Lycoming motor is economical to operate; that it is as comfortable and as finely finished as a good car, and that it has beauty of line and exterior finish of which you may well be proud.

Then compare its low price with any other airplane on the market. You will find that the Stinson Model R is your logical choice.

If you are considering the purchase of an airplane, won't you write or wire us today so that we may present the Model R for your inspection?

STINSON AIRCRAFT CORPORATION, WAYNE, MICHIGAN  
Division Cord Corporation



**More Than Ever "The Aircraft Standard of the World"**

## CURRENT AIRPORT AND AIRWAY FACTS

### *Faster Coast-to-Coast Trips*

**T**RANSCONTINENTAL & WESTERN AIR started flying revised schedules, beginning March 1, to drop three hours in elapsed time from the Los Angeles to New York schedule. The T. W. A. mail and express planes now make the trip across the continent in twenty-two hours and forty-two minutes, making possible deliveries in New York early on the second morning after departure from Los Angeles. New low fares were announced in conjunction with the new schedules.

New T. W. A. schedules, effective March 1, also speed up plane and train passenger service throughout the Middle West. The changes affect air mail service all along T. W. A.'s transcontinental route. They facilitate travel in the Middle West by giving better service to towns and cities from Detroit and Chicago in the North to Tulsa, Ft. Worth, Dallas, and Houston in the South. The Wabash and Pennsylvania railroads, United and Bowen airlines, and American Airways have a part in speeding the Middle Western travel service.

The present schedule from Los Angeles to New York sends mail and express planes out of Los Angeles at 7 p. m., Pacific Coast time, instead of 3:05 p. m., enabling West Coast business men to put a full day's mail on the plane.

### *Resume Spokane-Seattle Service*

**T**HE Mamer Air Transport of Spokane, Wash., schedules a resumption of its Spokane-Wenatchee-Seattle transport service, carrying passengers and express, April 1, using Ford trimotor planes. This run has been operated for the past two years, from April to November. With the completion of a Department of Commerce radio broadcast station in Spokane and improvement of a number of the emergency landing fields between the two terminals, it is planned to continue operations the year 'round.

The service is daily, the westbound plane leaving Spokane at 8 a. m. and arriving in Seattle at 10:30 a. m. The eastbound plane leaves Seattle at 5 p. m. and arrives in Spokane at 7:30 p. m.

### *Better Service to Montreal*

**A** WEEK-DAY air passenger service, using the new Pilgrim airplanes, was inaugurated between New York and Montreal by American Airways, Inc., March 12. American Airways has operated the airline between the two cities since October, 1928, using small planes, but passengers could be accommodated on Mondays only when the mail load was light enough not to conflict with the gov-

ernment ruling prohibiting the carrying of passengers and mail in the same compartment.

The Pilgrims are scheduled to leave Newark Airport at 7:00 a. m. and arrive in Montreal at 11:15 a. m. They leave Montreal at 12:15 p. m., arriving in Newark at 4:15 p. m.

### *Extend Airway's Radio Equipment*

**N**ORTHWEST Airways has ordered over \$50,000 worth of radio telephone units from the Western Electric Company to complete its program of equipping landing fields and planes for two-way radio-telephone service. The project involves equipment for four ground stations and seventeen planes.

The landing fields to be equipped with radio-telephone stations are located at Bismarck, N. D.; Milwaukee and Madison, Wis., and Chicago. Four other fields on Northwest Airways already are equipped with two-way radio-telephone stations. They are at Duluth and St. Paul, Minn.; Fargo, N. D., and the line's terminus on the Canadian border at Pembina, N. D.

### *Weather Causes Trick Telephony*

**A**N atmospheric peculiarity known as a "skip distance" played tricks with short-wave telephony from airplanes of United Air Lines, according to a recent report. The voice of a pilot of a night air mail-passenger plane flying between New York and Chicago was heard clearly at Ft. Worth, Tex., a thousand miles distant, when the ground station operator at Chicago could not hear him. Another pilot flying over Redding, Calif., was heard at Des Moines, approximately 1,900 miles away, when his voice could not be distinguished by the dispatcher at Oakland, only 300 miles distant. The voice of a flier over Kansas City was heard more distinctly at Spokane, Wash., than at Moline, Ill., and a pilot flying over the eastern part of the state of Washington picked up the voice of another air mail flier reporting his position to Oklahoma City.

Provision is made to counteract these unusual atmospheric conditions by having the pilots covered not only by the home station but by distant dispatchers who can serve as middle men between the pilot aloft and his designated station.

### *Market Reports for Air Travelers*

**U**P-TO-THE-MINUTE market quotations are now supplied passengers en route on Eastern Air Transport planes. This is made possible by an arrangement between the brokerage firm of Fenner, Beane & Ungerleider and the Eastern Air Transport System.

Under the arrangement last-minute prices are given each airport by the brokerage firm, and the listings, on a special card, are placed aboard each plane. New information is available at every stop. The cards bearing the quotations are available to all passengers while in flight, and each may transmit brokerage instructions immediately upon landing at the next station.

### *L. F. Schoenhair Flies for American Airways*

**L**ELAND F. SCHOENHAIR, one of the country's best known pilots, is flying the Cleveland-Dallas route for American Airways. Schoenhair has been prominently associated with aviation for many years. He won the Los Angeles-Cleveland non-stop flight to the Air Races in 1929 and flew to the Canal Zone in 1930 to bring the first pictures of the Byrd Antarctic Expedition to New York.

### *Lower Fares to Latin-America*

**A** REDUCTION in rates for air passengers has been made by the Pan-American Airways system because of increased air travel between the United States and Latin-American countries. The reductions are on all-air passenger fares from Miami to points throughout the West Indies, Central and South America, exclusive of Nassau and Havana. Baggage allowances are increased on hauls over 1,000 miles.

Under the new rates the air circle of South America, including Central America and the West Indies, can be made from Miami for \$1,280.70, giving sixteen flying days, with overnight stops in fifteen important ports. The total distance is 14,018 miles, and the passenger is carried into twenty-nine foreign countries and colonies. A trip over the Lindbergh circle can be made at a cost of \$537.30.

### *January Air Traffic Increases*

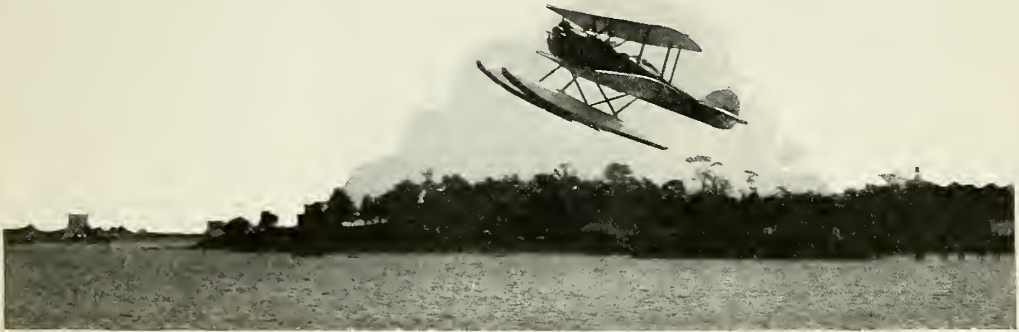
**D**EPARTMENT of Commerce figures show for scheduled American air transport lines a rise of about fifty per cent in miles scheduled and flown in January, 1932, over the same month in 1931. A total of 2,753,500 miles was scheduled in January, 1931, and 2,475,306 flown. Out of a scheduled 4,612,388 miles in January, 1932, a total of 3,733,820 was flown.

Passenger traffic increased thirty-six per cent with a January, 1932, total of 23,990 passengers and 6,248,262 passenger-miles, as compared with 17,549 passengers and 4,064,869 passenger-miles in January, 1931.

Air mail, at 742,787 pounds, showed a gain of about three per cent, while air express, at 83,903 pounds, advanced about thirty-seven per cent. Gasoline and oil consumption increased approximately sixty per cent.

*(Continued on following page)*

# TWO PLANES FOR ONE



*Up and away! EDO Floats assure leadership in air and water performance.*

**T**WO kinds of planes in one, giving incomparable performance and service for two kinds of flying—the smooth, flashing power of the finest land plane, and with a quick change to EDO Floats, the doubled utility, pleasure and profits of the modern seaplane.

EDO all-metal Floats are designed and built to fully develop the efficiency and performance of your machine. They will not appreciably lessen its take-off, speed or maneuverability. So equipped, the average ship will outfly, *from every standpoint*, the nearest competing amphibian or flying boat. Think of it! Land plane performance with seaplane utility.

Enterprising operators and water-wise sportsmen alike, have been quick to grasp the advantages of owning two planes in one. Equipped with EDO's they switch back and forth from wheels to floats and gain, with-

cut compromise, the pleasure and earning power of both machines.

Now—with prices generously reduced—you may own "both planes" for but little more than the cost of one! Fly *your ship* on EDO's this year for greater payloads or pleasure. No need to end your trips in an airport cab. Land where you wish, at city dock, secluded lake, or popular shore resort. Make the endless waterways your personal airdrome and enjoy the safety, convenience and obvious utility of the convertible seaplane.

Prepare now for the season. Write today for the new prices of EDO Floats and a list of over 40 popular types of land planes which can be EDO-equipped without change of license status. Address, EDO Aircraft Corporation, 610 Second Street, College Point, Long Island, N. Y.

**NOW**  
**25%**  
**AVERAGE REDUCTION**  
**IN EDO PRICES**

**Don't miss the EDO Exhibit**  
**at the Detroit Show**  
**April 2nd to 10th.**

**EDO FLOATS**



(Continued from preceding page)

#### Varney Parcel Service Active

**V**ARNEY Parcel Service officials report that since the new Sikorsky air ferry has been placed on the transbay run from the San Francisco Bay Airdrome, between fifty and seventy-five packages are being flown across the bay daily. Two motorcycles are used to pick up and deliver parcels in their respective districts.

Varney Speed Lines announces that W. P. Thomas, former Varney traffic representative at the San Francisco Bay Airdrome, is now in charge of outside solicitation for the Varney Parcel Service.

#### To Start Maine Air Service

**P**ASSENGER service from Portland to the lakes of Northern Maine will be inaugurated May 15 by Maine Air Transport, according to an announcement by Capt. William H. Wincapaw, president. Cabin monoplanes, equipped with pontoons, will be used. One round trip each day is planned. The airline will resume its Casco Bay service from Portland to the islands as far as Boothbay Harbor on May 15.

Plans for resumption of passenger and mail air service from Boston to Maine are being made by Pan American Airways Corp., operators of the service last summer. During August and September nearly 15,000 miles were flown.

The reorganization at Augusta, Me., of Maine State Airways, Inc., is planned. Headed by Jack Dodge, the company gave flying instruction in 1931 to a number of men who have since received pilots' licenses. A flying school will be conducted again this year.

#### Change New York Terminal

**V**ICTOR VERNON, general manager of the Colonial Division of American Airways, Inc., has announced the transfer of their New York terminal from the Pennsylvania Hotel to the Depew Place entrance of the Hotel Commodore, adjoining the Grand Central Terminal. Closed automobiles are used to transport passengers between the airport and the hotel in place of buses, the cars leaving the Commodore at two-hour intervals from 8:30 a. m. to 6:30 p. m.

#### Make Radio Communication Record

**A** RECORD in airline radio communication was established in February by pilots and radio operators of Transcontinental & Western Air in the completion of two-way radio contacts between planes and ground stations. With two-way contact scheduled for each pilot every half-hour, a total of 5,203 were scheduled and 8,821 completed by both pilot and ground operator. On the western division of T. W. A. between Kansas City and Los Angeles, where radio

is used for point-to-point communication by code as well as two-way voice communication with pilots in flight, 26,182 messages, or an average of 902 per day, were transmitted with a total of 137,426 words. The total number of messages handled was an increase of three per cent over January.

#### Hangar Mechanics Invent Aids

**A** NOVEL battery "barrow" has been developed by the mechanic personnel in the Seattle hangar of United Air Lines to facilitate the work of removing batteries from the company's single-engined and trimotor transport planes for recharging. During the winter months, especially, United Air Lines finds that batteries must be recharged frequently, and considerable labor is involved in removing the batteries from the planes and carrying them across the hangar to the charging station. The company's personnel, therefore, developed a small two-wheeled truck with a rack on which the battery may be placed and sent quickly and effortlessly across the hangar. The truck was built of welded steel tubing.

An efficient dolly to place under the tail of the planes which must be moved in a hangar also has been produced by the Seattle mechanic personnel. The dolly, fabricated of welded steel tubing, embodies a lever action to expedite placing under the tail and lifting the plane.

#### United Air Lines Experiments

**U**NITED AIR LINES is experimenting on one of its Boeing trimotors with a complete set of thermocouple equipment and a new type of automatic supercharger regulator for Hornet engines. This equipment is designed to eliminate the necessity of having throttle stops on supercharged engines.

United Air Lines has also installed for test purposes a new gasoline flow meter, and although in service only a short time, a number of favorable comments on it have been received from pilots.

A cabin and cockpit liquid heating system is established in a Boeing trimotor of the company. Two heat-dispensing units are in the passenger cabin and one in the pilot's cockpit. The first boiler made for the system consists of one-half-inch copper tubes wound around the exhaust tail stack and covered with several layers of asbestos. A new boiler under construction will have tubes inside the exhaust stack itself.

#### Gorst Air-Water Taxi

**A**N "aeroboat" water taxi is in use by the Gorst Air Transport Company as regular equipment in its passenger service between Seattle, Bremerton, and Victoria. It is a seaplane equipped with a Johnson "32" and aids in taxying through the restricted harbors of the Northwest.

#### American Airways Cuts Fares

**A** GENERAL reduction of passenger fares throughout the entire American Airways system became effective March 1.

Advantageous airplane connections at Cleveland, Ohio, with the Southwestern Limited, leaving New York daily at 6:20 p. m., has been accomplished by the company and the New York Central Railroad. This coordination of schedules will put such cities as Cincinnati, Louisville, and Nashville half a business day away from New York; Memphis, New Orleans, Little Rock, Dallas, Ft. Worth, and San Antonio, Tex., one business day from New York. It also offers a new direct service between New York and centers as distant as Tampico and Mexico City, Mexico, of approximately forty-four hours, as contrasted to sixty hours by the fastest air-rail service heretofore available. Los Angeles, western terminus of the Southern Transcontinental, is two business days away.

#### Increase United Service

**U**NITED AIR LINES has announced an expanded passenger service, effective April 1, involving four trimotor passenger plane schedules daily between Chicago, Toledo, Cleveland, and New York instead of three, and additional trimotor passenger plane service between San Francisco and Los Angeles and another trimotor schedule between Portland and Seattle. This will bring United Air Lines' daily mileage up to 36,836 miles and will give United three schedules a day between Southern and Central California and four daily between Seattle and Portland. Thirty-seven trimotor Boeing and Ford transports in addition to approximately sixty Boeing mail-four-passenger, mail-two-passenger and cargo planes are now used in United's operations. A thirty-two-hour coast-to-coast service also has been announced by the company.

#### Reports Airports Established

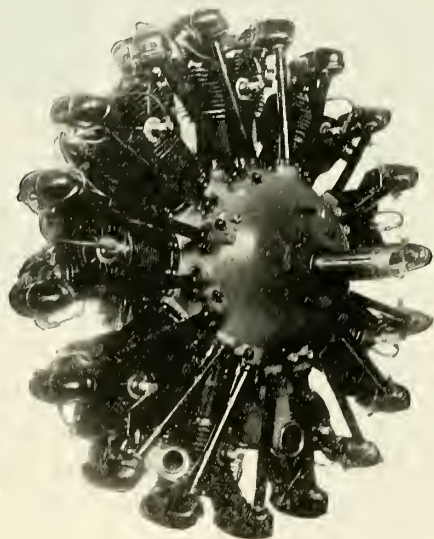
**A**IRPORTS were recently established, according to the Aeronautics Branch, Department of Commerce, at the following municipalities: Richmond, Ind.; Bloomsburg and Johnsonburg, Pa.; Marianna, Fla.; Galesburg, Ill.; Parlin, Colo.; Cut Bank, Mont.; Hampton, N. H.; Vermilion, S. D.; Moultrie, Ga.; East Millinocket, Me., and Santa Fe, N. M.

Proposed airports are listed at the following places: Hays, Kans.; Statesville, N. C.; Argyle, Wis.; Lamar, Colo.; Cowan, Tenn.; Folletts, Iowa; Somerset Center, Lake City, Rexton, and Sturgis, Mich.; Coxsackie, N. Y.; Stewartsville, Ohio; French Liek, Ind.; Springdale, Ark.; Union, Mo.; Hightstown, N. J., and Ellwood City, Pa.

(Continued on following page)



# ACHIEVEMENT LYCOMING AIRCRAFT ENGINES



Model R-680  
*Lycoming nine-cylinder,  
radial aircraft engine*

## A RECORD UNEQUALLED

Since its first installation in 1929, this Lycoming nine-cylinder radial engine has powered more four to ten-passenger cabin planes than all other makes of engines combined.

Consider these evidences of overwhelming preference for aircraft powered by Lycoming:

Of the 331 commercial aircraft engines in the 176 to 225 h. p. class sold during 1931, Lycoming sold 285 or 89%.

At the present time, Lycoming Aircraft Engines are being flown upwards of 75,000 miles daily (more than 3 times around the world) 27,000,000 miles per year on air lines in this

country. Recently one company flew 3,000,000 engine miles without an engine failure, using Lycoming engines.

Today more than 40% of the average daily air passenger traffic is carried in Lycoming-powered planes.

There are more, modern four-passenger cabin planes (powered by Lycoming) in use than all others combined.

The U. S. Army Air Corps recently selected Lycomings for their training planes because of their performance, dependability and long life.

Write for literature and detailed information.

*Lycoming Aircraft Motors will be exhibited at the National Aircraft Show, Detroit, April 2 to 10*

# LYCOMING MOTORS

LYCOMING MANUFACTURING COMPANY, WILLIAMSPORT, PA.

(Continued from preceding page)  
**New Lambert Field Building**

CONSTRUCTION of a new airport terminal building at Lambert-St. Louis Municipal Airport began March 3. The structure, according to detailed plans announced by L. R. Bowen, chief engineer of bridges and buildings, who designed the new building, will be the most modern in airport terminal construction. Designed along the lines of similar buildings in this country and Europe, the terminal will be two stories in height and of brick and concrete construction with a glass observation tower. Provision will be made in the building for the executive offices of the field, hotel rooms, a restaurant and cafeteria, barber shop, air mail post office, and the field control office.

A new feature in airport terminal construction which will be incorporated in the building will be underground passageways connecting the terminal with a building located on the edge of the flying field where planes can be loaded and unloaded without interruption. Freight will be transported from the terminal building to the plane through one of the passageways, while the other will be available for passenger use during inclement weather.

The new building is to be erected out of funds provided by the \$2,000,000 municipal airport bond issue approved by the voters of the city several years ago.

**Lambert Field Traffic Control**

RADIO control of all radio-equipped airplanes landing and taking off from Lambert-St. Louis Municipal Airport will be a feature of a central traffic control system to be inaugurated soon at the airport, according to O. R. Parks, field manager.

The new system was devised by a committee of local aviation leaders, headed by Mr. Parks. Copies of the St. Louis plan have been forwarded to the Commerce Department in Washington, together with a request for the assignment of a wave length at the field.

Under the new system, all traffic at the airport will be controlled from an observation tower to be located on the top of the new administration building. A radio broadcasting station will be installed in the tower, and all incoming planes will be contacted approximately ten miles from the field and told when and where to land. Weather conditions, direction and velocity of wind, position of planes in the air about them, and other information that will be helpful in making a safe landing also will be given the planes. An effort will be made, wherever possible, to bring the planes directly into the field, obviating the necessity for circling the airport.

Planes not equipped with radio reception will be regulated by two air traffic

control projectors which will be placed on the control tower. On the front of the tower a large neon sign will be installed to be used by the traffic dispatcher to indicate the runways for the take-off of such planes. An illuminated wind director, so constructed that it will be operated manually, if necessary, also will be located on the tower. All landings and take-offs from the field will be directed from the indicator.

At night, planes not equipped for radio reception will be guided into the port by means of light signals. As soon as a plane arrives over the field, a floodlight will be turned on. If the pilot does not wish such illumination, he will notify field officials by blinking his landing lights. Planes not equipped with landing lights will be presumed to want the floodlights.

All take-offs from the field, the plan provides, shall begin at the intersection of the taxi-strip and the runway nearest into the direction of the wind. In the case of radio-equipped planes, the pilot will be directed to the point of the take-off through that medium. Planes will be required to use taxi-strips around the edge of the airport when taxiing to the take-off position. At no time will a pilot be permitted to taxi directly down the center of the field into the face of incoming or outgoing traffic. After reaching the take-off position, the pilot will be required to await a signal from the control tower before taking off. This signal will be given either by radio or by a system of lights, a green light being used to signal the take-off and a red one to delay.

Extensive regulations governing the operations of planes after their arrival at the field and the activities of student and training planes also are contained in the control plan.

**Charleston Club Makes Gift to Airport**

A FULLY equipped ambulance was recently presented to the Charleston, S. C., municipal airport by the Exchange Club of the city. Believed to be the first civic group to furnish an ambulance for an airport, the Charleston club made the gift as a contribution to the National Exchange Club program of "Service to Aviation."

**Springfield, Ill., Airport**

FOURTEEN scheduled passenger and mail planes a day land at the Springfield, Ill., airport. The airport comprises 120 acres, which are four miles southwest of the city. The field is equipped with border lights and floodlights and a revolving beacon. A steel hangar, 80 feet by 80 feet, and a U. S. Weather Bureau office are located at the airport, where licensed mechanical service also is available.

**Faster St. Louis-Mexico Service**

NEW half-day service from St. Louis, Mo., to San Antonio, Austin, and Waco, Tex., and a twenty-five-hour air-rail service to Mexico City, Mexico, has been announced by A. J. Garipey, St. Louis traffic representative for American Airways, Inc. The former best air-rail service between St. Louis and Mexico City, Mexico, was forty-nine hours.

Passengers leave from Lambert-St. Louis Flying Field daily in an American Airways, Inc., plane to the Southwest on the following schedule: Leave St. Louis at 11:35 a.m., arriving in Memphis at 2:11 p.m., Little Rock at 3:17 p.m., Texarkana at 4:51 p.m., Dallas at 6:28 p.m., Fort Worth at 6:54 p.m., Waco at 7:35 p.m., Austin at 8:37 p.m., and San Antonio at 9:30 p.m. At San Antonio passengers make connections with a Missouri Pacific train departing for Brownsville at 10:15 p.m. and arriving next morning at 7:55 a.m. A Pan American Airways plane leaves Brownsville for Tampico and Mexico City at 8:45 a.m., arriving at the latter two cities at 11:00 a.m. and 1:45 p.m., respectively.

**Appointed Air Traffic Manager**

THE appointment of Walter H. Sandt, Jr., as air traffic manager for Postal Telegraph has been announced by Guy S. Paschal, manager of the telegraph company's aviation department. For several years Mr. Sandt has been closely identified with the air transportation industry as air traffic engineer. He has been associated with the Airlines Consolidated Ticket Office in New York, North American Aviation, Inc., and the Aviation Corporation.

**R. S. Maugham, Jr., Promoted**

RALPH S. MAUGHAM, JR., terminal manager at Boston for the past two years, was transferred to Newark, N. J., as division traffic superintendent in the Colonial Division, American Airways, Inc., general offices March 15, according to an announcement by Victor Vernon, general manager of the division. Mr. Maugham has been connected with American Airways since October, 1928, and has served in various capacities at Albany, Schenectady, and Montreal.

**Resume Cleveland-Detroit Amphibions**

FOUR planes daily are scheduled for operation between Cleveland and Detroit via a route across Lake Erie, beginning April 1, by the Transamerican Airlines Corporation. The service, which has been discontinued for the winter season, will use amphibion planes. Two other planes each day will be flown between the two cities over the winter route, via Toledo.

Transamerican Airlines also operates on three daily schedules between Chicago, South Bend, and Detroit, with regular services to other important Michigan cities.

# Use Roosevelt Field

AMERICA'S PREMIER AIRPORT

*The Center of Commercial Aviation in the East*



*Typical Concrete and Steel Hangars*



*Typical Wooden Hangars and Buildings*

## ★ The Most Logical and Ideal Location ★

**LOCATION:** Most conveniently accessible by air from other metropolitan airports and Northeastern U.S. Situated well away from water, swamps and industrial smoke, the meteorological conditions are the best in the area.

**SAFETY:** Offers greatest flying safety with three great airports, twelve golf courses and open country all within a three mile radius, absence of congested building areas, water and swamps. Emergency landings are safe.

**FACILITIES:** Fifty buildings, 350,000 sq. ft. hangar space of which 131,000 is in new concrete and steel hangars, complete night lighting, two famous all-way fields with 1,800,000 sq. ft. paved runways, taxiways and aprons.

**COST:** Rental from 32¢ per sq. ft. per year up, according to buildings, which is most reasonable considering facilities and convenience to the world's largest city and America's densest flying area.

**ACTIVITY:** There are more airplanes in New York than any other State, more in its metropolitan area than elsewhere in New York, and twice as many at Roosevelt Field than at any other metropolitan airport.

**PROMINENCE:** The most famous and widely known aeronautical address in the world, it has long dominated as the commercial aviation center of the East. This is a valuable asset to your aeronautical business.

### MOST-CONVENIENT TO NEW YORK CITY

Express train service provides shortest and most dependable transportation to center of Manhattan. Over 80 trains per day, some taking only 32 minutes, ply between Penn. Station, N. Y. City and Mineola, the Field station. Excellent motor roads and a private parkway lead to the Airport.



*The Roosevelt Field Hotel—Modern in every appointment*

**Airplane Agencies:** Bird, Lockheed, Monocoups, Aeromarine-Klemm, Kittyhawk, Stearman, Stinson, Waco, Aeronca, Fairchild, Fleet, Standard, Aristocrat, Amphibions, Travel Air, Kellett Autogiro, Curtiss-Wright, Rearwin-Kenroyce.

**Service Hangars:** Air Associates, Inc., Air Services, Inc., Fleetwings, Inc., General Airplanes, Inc., N.C.L., Inc., Aero Trades Co., Long Island Aero Service, Geo. M. Pynchon, Jr., Inc., Roosevelt Aviation School, Inc.

**Repair Services:** Air Associates, Inc., Air Services, Inc., Long Island Aero Service, General

Sheet Metal & Welding Co., Parker Motor Rebuilding Co., Roosevelt Aviation School, Inc., Giro Sales & Service, Aero Trades Co., Engine Air Service.

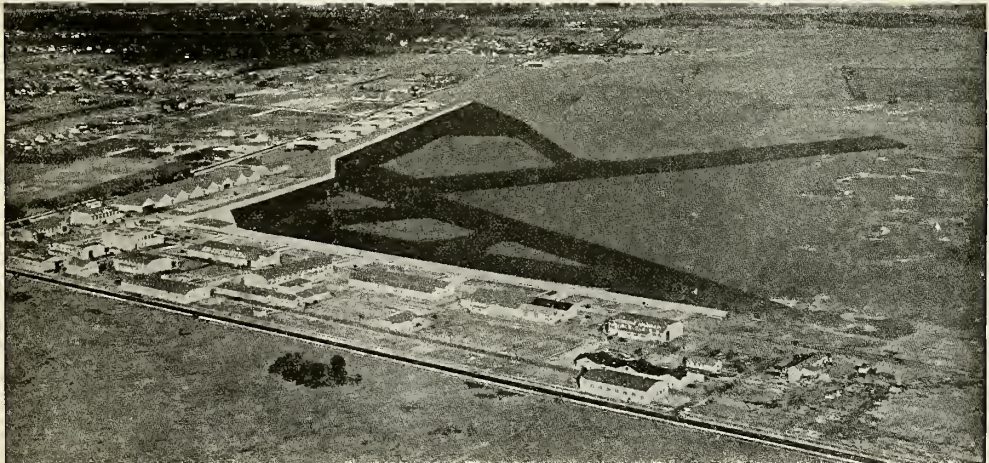
**Supply Houses:** Air Associates, Inc., Air Transport Equipment, Inc.

**Parts and Service:** Motors: Kimmer, Cirrus, Pratt & Whitney, Continental, Warner, Wright, Menasco. Parachutes: Irving, Russell-Loeb, Switlik, Bendix, Pioneer Instruments, American Paragon Wood Propellers, Hamilton Standard Steel Propellers, Felipe Starters, Scintilla Magnetos, Stromberg Carburetors.

**Manufacturers:** Amphibions, Inc., Fleetwings, Inc., General Airplanes, Inc., Grover Loening Aircraft Co., Air Transport Equipment.

**Aerial Advertising:** Plane Speaker Corp., Skywriters, Inc., Fairchild Aerial Surveys, Air News, Inc. **Experimental Laboratories:** Fleetwings, Inc., R.C.A., Good Inventions, Inc.

**Aviation School:** Roosevelt Aviation School, Inc. **Airplane Taxi Service:** Roosevelt Flying Corp. Divisional Office for District No. 1, Aeronautics Branch, U. S. Department of Commerce.



Inquire of Geo. W. Orr, Pres., or Walter L. Avery, Operations Mgr., at Space No. 129, Transcontinental Airway, at the Air Show. Or write to Mineola, L. I. (Drawer F).

## ROOSEVELT FIELD, INC.



## THE NEW FORD AIR LINER

**T**HE new tri-motored Ford model 14-A transport airplane represents a distinct advance in the design of large passenger craft. Its novel aerodynamic, mechanical and passenger-accommodation features make it outstanding in its class. Developed by the Airplane Division of the Ford Motor Company to fulfill the needs of airlines for de luxe operation on trunk airways and cross-continent routes, its comfortable accommodations rival the most luxurious forms of surface transportation. Anticipating the requirements of night operations, sleeping accommodations comparable to those of the Pullman car are provided.

The model 14-A is an all-metal cantilever monoplane. One of its outstanding design features is the installation of two outboard engines entirely within the wing, bringing the aerodynamic efficiency of the tri-motored design close to that of the single-engined high nacelle type. In addition to the paramount requisite of safety, considerable attention was given to such problems as cabin ventilation, heating, noise abatement, roominess, and similar items contributing to comfort.

The center engine is placed above the fuselage, housed in a nacelle on a streamline pedestal support. The fuselage,

which is roomy and comfortable, is well faired. All control surfaces are balanced to reduce the effort required to operate them. The landing gear is of a semi-retractable type and a compromise between a retractable and conventional type of chassis. The wheel struts are extended for take-off. In flight the wheels are retracted within streamlined housings. The gear is again extended for landing. This design results in the exposure of a minimum of chassis members in flight, thus reducing the parasite drag. When at rest on the ground the wheels are retracted, bringing the fuselage to a nearly horizontal position, and the door sill close to the ground. Shock absorbing members are unusually well faired; consequently resistance is decreased. The tail wheel structure is virtually enclosed in the body, well forward of the tail. Such a design leaves the body lines uninterrupted and affords a nice merging of the trailing portion of the body and rudder. Control horns and cables are fully enclosed.

### Fuselage Arrangement

The pilots' compartment is situated in the extreme forward portion of the fuselage giving unusual visibility in all directions. The compartment is provided with seats for two pilots. Visibility over-

head to the rear is insured by a mirror in the roof. The compartment is reached through a door in a partition separating it from the smoking room. An exit door for pilots leads from the left side of the smoking room.

A rear door leads from the smoking room to the main cabin which contains four main passenger compartments, identical in size, and separated amidship by two lavatories, one on each side of the ship, followed by the steward's galley or the right side, baggage compartment on the left side, and the main companionway to the rear leading to the main entrance doors on either side of the plane.

A large window in each passenger compartment affords especially good vision horizontally and downward. A wide central passageway leads from the smoking room to the main companionway. Passengers have complete freedom of movement about the plane.

Passenger compartment arrangement follows that of Pullman cars. Each compartment is divided into two sections separated by the main passageway. Each is 8 feet 11 inches wide, 6 feet 2 inches long and 6 feet 10 inches high, giving a total volume of 375 cubic feet. Each section has two facing double seats accommodating four passengers.



Three-quarter front view of the Ford model 14-A monoplane

The cabin is 41 feet long, 8 feet 11 inches wide and 6 feet 10 inches maximum height, having a volume of 1,948 cubic feet, exclusive of lavatories, baggage and galley compartments. Seats are convertible into lower sleeping berths. For night travel, provision is made for installing upper berths at air depots as needed, eliminating the necessity for carrying this added weight in daytime flying or at night when not required.

#### Cabin Equipment and Finish

The cabin interior is particularly attractive because of the absence of exposed structural members. The cabin is thoroughly insulated against noise. Skylights admit light to the interior where side windows cannot be installed. The seats, of standard Pullman size and arrange-

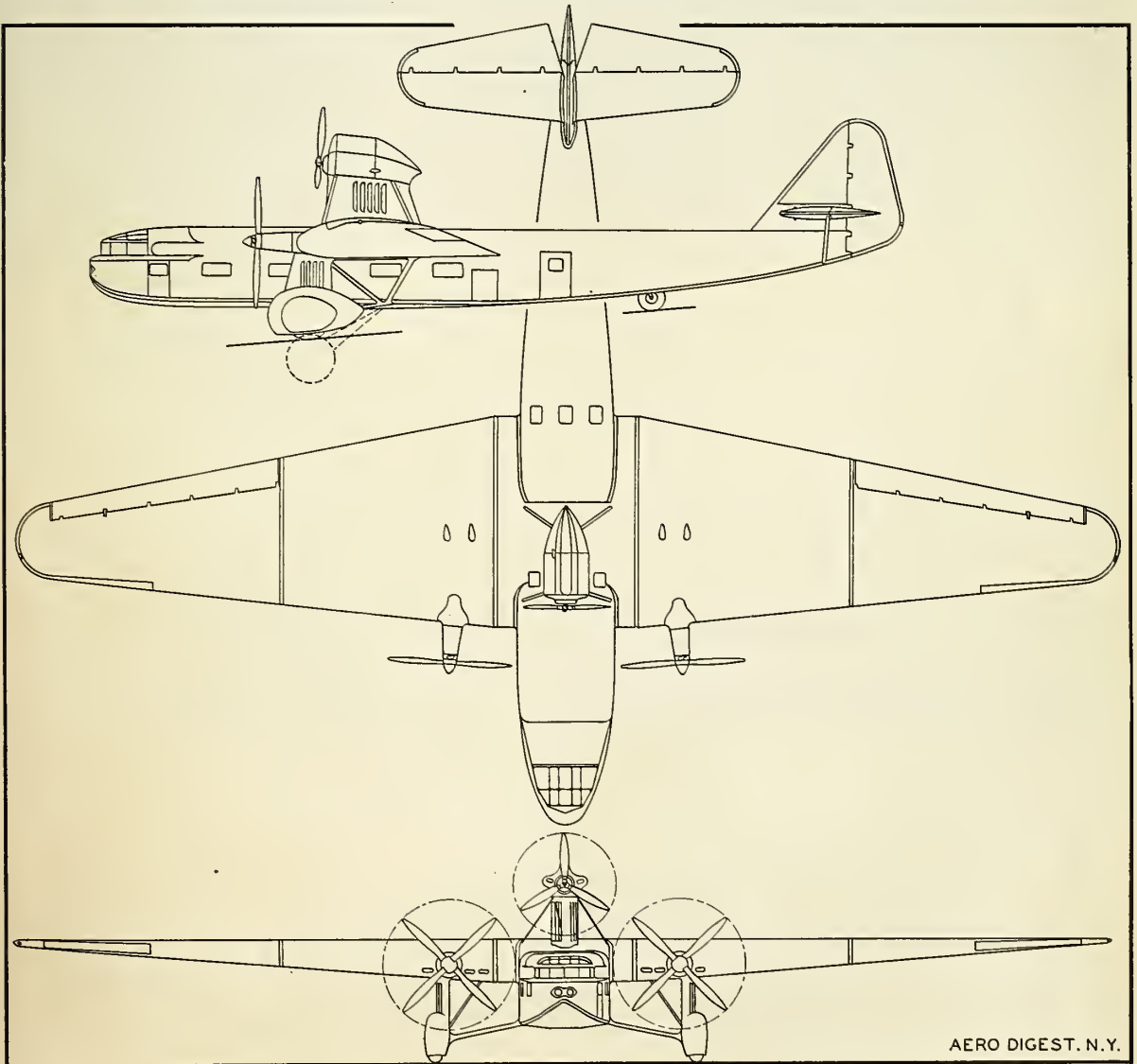
ment, are upholstered in cloth with the exception of the smoking compartment where the upholstery is of leather of a soft tan tint.

Cabin interiors are finished in harmonious color schemes. The seat cushion construction is of sectional rubber segments inflated with air to give utmost passenger comfort. The walls below the windows are of Ford aero board, finished to give the effect of natural wood. The ceiling is covered with cloth of neutral buff hue.

The compartments are fitted with lights above the seats. Dome lights in the aisles give additional illumination. Push buttons below the windows operate signals in the steward's galley, which is furnished with such conveniences as a two-burner gas stove, refrigerator, warming oven,

cupboards and running water. A drinking water fountain is located in the main passageway.

Cabin heating and ventilating is accomplished through an ingenious automatic forced draft system. Fresh air is taken into the system at the leading edge of the wing behind the outboard propellers. On entering the wing the air is passed through heating radiators and thence to a distributing air duct in the aisle ceiling running the full length of the cabin. Heat is supplied to the radiators by circulating prestone through a tube within the exhaust manifold of the engine. The heated radiators warm the air before it is passed through the duct to the cabin. The amount of heat passed is regulated by a valve controlled by a thermostat in the cabin. Registers placed



AERO DIGEST, N.Y.

Three-view outline drawing of the 2530-horsepower Ford model 14-A transport airplane



Power plants of the Ford model 14-A and an interior view of the cabin during construction

at frequent intervals in the sides of the duct regulate the volume of incoming air. The exhaust ventilators are located beneath the seats. They consist of louvers mounted on the skin under the fuselage, connected by short individual ducts to mushroom covers and sound-absorbers on the floor.

The baggage compartment has 137 cubic feet capacity, with doors of sufficient size to permit loading articles as large as a wardrobe trunk.

#### Fuselage Structure

The fuselage is of the built-up open channel truss type of composite construction. The central portion, providing attachment for the main wing beams and landing gear, is of heat-treated special alloy steel channels and gusset plates while in the fore and aft portions, which are similar in construction, heat-treated duralumin is used. The covering is corrugated sheet alclad. Transverse bulkheads are of diamond type trussing, providing an opening in the center without sacrificing the torsional rigidity of the assembly.

Wing stubs, to which the outer wing panels are attached, are built integral with the central portion of the fuselage.

#### Wing Construction

The wing, which has a total span of 110 feet, is tapered in plan form and thickness, the maximum depth being 4 feet 3 inches and the maximum chord 20 feet 10 inches. Each outer panel comprises an intermediate and a tip section. The intermediate sections are of steel structure, the tips of duralumin. The outboard engines and fuel tanks are located in the intermediate wing sections.

The wing structure consists of two main beams, three active auxiliary beams, widely spaced main rib trusses and corrugated alclad covering. The main beam chord members depart from the usual Ford type open channel construction,

using instead a newly developed omega-shaped member. Male and female clevis type steel fittings are used between the tip section and intermediate panels. The wing panels are secured to the fuselage stub by means of ten fittings. The alclad skin is attached to the chord members and main ribs by duralumin rivets. Steel forgings are used extensively for fittings.

Decision to use steel in the fabrication of the central fuselage section and the intermediate wing sections involved months of rigorous research in the Ford airplane factory and steel mills. The result was the development of methods which delivered the relatively thin high tensile steel shapes from the heat treating ovens and quenching baths in perfect condition for assembly into the structure.

In order to obtain high strength in the rivets, the use of stainless steel was determined upon. Special riveting hammers were developed which pass an electrical current through the rivets during the heading process so as to shorten greatly the time required for driving. This method permitted control of the temperature of the rivets during the heading process and resulted in giving the rivets maximum strength after cooling.

The outboard engines are mounted on welded-tube engine beds, and attached to the wing structure by three-point suspension. Engines are enclosed by steel fire walls forming a compartment. Smooth sheet steel covers portions of the upper skin in the region of the engine exhaust openings.

#### Power Plant

Three Hispano-Suiza engines of French manufacture are used because of the successful experience with this make of engine in the Ford single-engined freight airplane and because no domestic engines of suitable power at present are available commercially in the United States.

The center engine, rated at 1,100 horse-

power at 2,000 revolutions per minute, is a direct-drive, three-bank, 18-cylinder type 18Sb, driving a three-bladed adjustable metal propeller of 10 feet 2 inches diameter. The engine with all its accessories, cooling and lubricating systems and structural supporting members is completely enclosed by a cowling and pedestal fairing, with the exception of four external diagonal brace struts. The engine is a commercial modification of the racing engine designed for the 1929 Schneider cup race.

Cooling is accomplished through a cartridge core type radiator mounted below the engine. The cartridge tubes are set at an angle to the face and normal to the propeller slipstream. Air is admitted through shutters, led through the core and out on the port side through long vertical louvers. Shutters are remotely controlled.

The two outboard engines are two-bank, 12-cylinder type 12 Nbr, geared 2 to 1, each delivering 715 horsepower at a crankshaft speed of 2,000 revolutions per minute and driving a four-bladed wooden propeller of 12 feet 10 inches diameter.

The propeller shaft of each engine extends through the leading edge of the wing, being supported by a self-aligning ball bearing mounted on a tubular welded mount. The extension shaft is attached to the engine through a special universal joint, the design of which is based on the constant velocity universal joint principle successfully used on four-wheel drive heavy-duty trucks.

Each outboard-engine has a radiator suspended under the leading edge of the wing directly in front of the landing gear shock absorbing strut. It is enclosed with the strut in a streamline formed as a continuation of the wheel fairing. The support of the radiator is independent of the landing gear. Air circulation through the radiator follows the same method as employed for the center engine; that is,

air enters through remotely-controlled adjustable shutters, and is exhausted through vertical outlet louvers on the opposite side.

Each outboard engine operates a compressor to supply compressed air for starting, operation of shock absorber struts and the wheel brakes.

Access to the wing engine compartments in flight is possible through doors leading from cabin lavatories into the wing interior. For ground servicing there are large hatches on the upper surface of the wing and smaller access doors on the lower surface.

Four tanks are located in the wings—outboard of the engines—two in each intermediate section—and have a total capacity of 500 gallons. Three oil tanks, one for each engine, have a total capacity of 48 gallons. Each wing oil tank has a capacity of 14 gallons, that of the center engine 20 gallons.

Each engine is equipped with a carburetor for each two cylinders. There are nine in the center engine, six each in the wing engines. The carburetors are supplied with air at atmospheric temperatures or preheated as conditions require.

#### Landing Gear

The landing gear consists of two independent units mounting 58 x 14 inch wheels, equipped with pneumatically operated brakes. The tread is 26 feet 5 inches. Each wheel is supported by an oil-pneumatic shock absorber strut having a retraction-extension range of 48½ inches. The fore and aft brace consists of a tubular V-member which serves also as a torque-resisting structure. The apex of the "V" is hinged to a tripod on the wing structure.

When the plane is on the ground the wheels are retracted within the streamline housings. Before the take-off, the shock absorber struts are extended through operation of controls in the cockpit. After take-off the wheels are retracted to reduce resistance in flight but lowered again just before a landing. The semi-retractable feature of the landing gear necessitated a special arrangement of the structure to permit rotation without undue toe-in or camber of the wheels.

The landing gear is operated by a compressed air system controlled with a selector air valve and two electric solenoid-operated air valves. These selector valves are mounted on the control pedestal in the pilots' compartment and the valve position is illuminated at night by an indirect lighting system. Two indicators, showing the position of the wheels at all times, are located in front of the pilots. In addition to this device, a green warning bull's eye is supplied. This is automatically lighted when the landing gear is in the extended position for landing.

The tail wheel installation consists of a welded unit hinged to the lower center of the adjacent forward fuselage bulkhead and to the shock-absorbing member, which is attached to the top center of the bulkhead. The wheel is mounted on the continuation of the shock-absorbing unit and is free to turn around the strut axis.

#### Tail Surfaces

Stabilizing and control surfaces are rugged and simple in construction. Main beams are of the built-up channel type reinforced with ribs and covered by corrugated alclad aluminum. The stabilizer, having a span of 34 feet 3 inches, is lo-

cated well above the fuselage and braced from below by struts. The position may be adjusted from the cockpit. The full cantilever fin is carried on an extension from the fuselage bulkheads.

#### Controls and Instruments

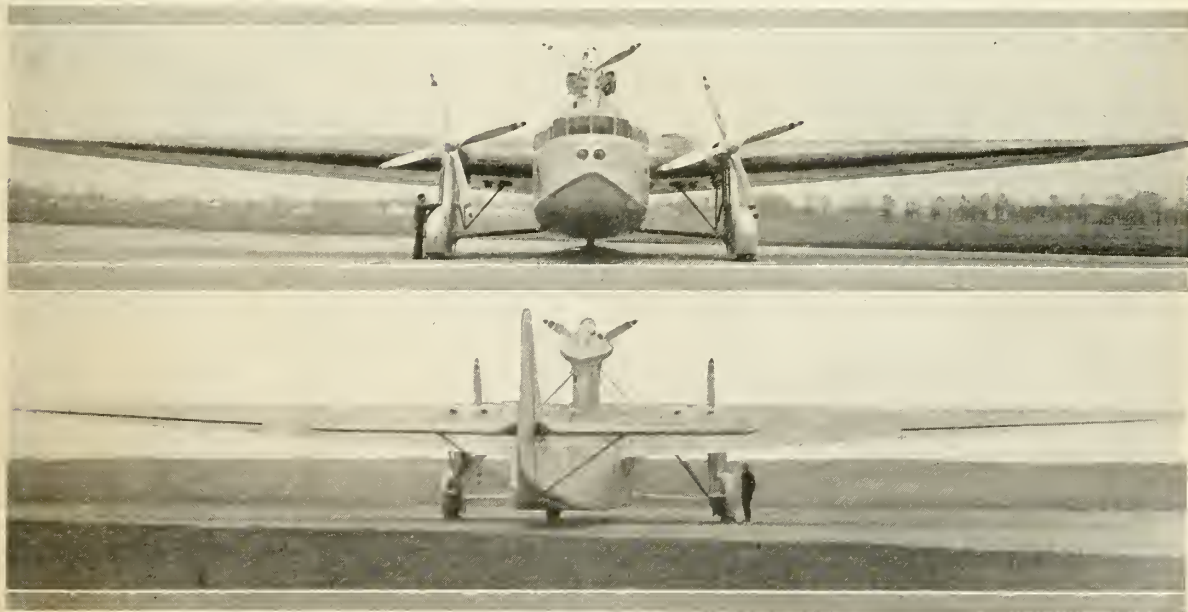
The pilots' cockpit is provided with wheel-type dual controls and rudder pedals, with toe extensions for the wheel brakes. Surface controls are actuated through a system of cables under the passageway floor to bell cranks connected to push-pull rods. The entire system is fully enclosed.

Control cables, electric wiring, instrument connecting lines, etc. are segregated in two groups, one placed under the floor and the other in the ceiling of the passageway. Floor and ceiling covers are readily removable for ease of inspection, repairs and replacements.

Dual flight controls enable either pilot to fly the airplane. Stabilizer adjustment crank handles are located on a panel behind and above the seats with an indicator to show the angle of the stabilizer setting.

Engine controls, such as throttle, spark, mixture, main and individual ignition switches are located on the pedestal forward of and between the two seats. Arrangement is provided for automatically advancing the spark when the throttles are opened and for supplying a richer mixture when the throttles are closed.

The fuel system control comprises three main shut-off valves for the engine lines and two valves for the four fuel tanks, arranged to enable selective use of any or all tanks. These valves are mounted between the two stabilizer adjustment handles.



Direct front and rear views of the new model 14-A trimotored transport airplane

In addition to these controls and valves there are the landing gear controls mentioned previously, priming and starting controls, consisting of a gasoline primer selector valve and hand pump with an air selector and shut-off valve, switches for landing lights, navigation lights, instrument panel and compass lights. Two emergency switches for the generator field and the battery main line are located within easy reach.

Indicating instruments, with the exception of the two compasses, are mounted on the instrument board and may be indirectly lighted at night. Electric type engine instruments are located on the right side of the instrument panel. Four hydrostatic gasoline gauges, one for each fuel tank, are on the left side of the panel.

Three fire warning indicators are set directly above each group of engine instruments. Excess heat in any of the engine compartments actuates thermostats which switch on a red light which is bright enough to be seen even in sunlight.

#### Specifications

Wing span .....	110 feet
Length overall .....	80 feet 10 inches
Wing chord, maximum .....	20 feet 10 inches
Height overall, wheels retracted .....	19 feet 6 inches
Height overall, wheels extended .....	23 feet 7 inches
Wing area .....	1,600 square feet
Stabilizer area .....	130 square feet
Elevator area .....	102 square feet
Aileron area .....	110 square feet
Fin area .....	42 square feet
Rudder area .....	61 square feet
Wheel tread .....	26 feet 5 inches
Power available (total) .....	2,530 horsepower

## DIGEST OF FOREIGN TECHNICAL ARTICLES

By

Elsa Gardner

### AIRPLANE PERFORMANCE

Some Possible Causes of Discrepancy in the Performances of Aircraft of the Same Type, W. G. Jennings. (British) Aeronautical Research Committee—Reports and Memoranda No. 1428, August, 1931, 5 pp., 3 figs.

THE reported investigation was made to determine some of the possible causes that may contribute to the discrepancy which sometimes arises between the measured performances of aircraft of the same type. The following sources of error were considered and the magnitude of their effect on the resulting performance deduced: vertical currents; variation of power developed by the same type of engine; errors due to incorrect variation-of-power-with-height law assumed in the reduction; differences in propellers made to the same design, and the consequent variation in rate of rotation when absorbing the same torque. It was concluded that the first, third, and fourth of these sources of error may each produce a difference of about one per cent in top speed, and that the second may produce a difference of 1.5 per cent.

### FRICION AND FLOW RESISTANCE IN ENGINES

The Frictional Resistance of Airplane Engines (Die Reibungswiderstände des Flugmotors), K. Löhner, *Zeitschrift fuer Flugtechnik und Motorluftschiffahrt*, Vol. 23, No. 2, January 23, 1932, pp. 51-54, 4 figs.

THE power required to start an airplane engine ready for service is shown, including the frictional losses which are considerable, compared with the balance of the performance curve, and the resistance to the flow of fuel which is caused by the suction and displacement of the gases. The individual effects are given in a series of measurements taken on B. M. W. IV and VI en-

gines. These results are compared with measurements obtained in the United States.

The investigation proved that the resistance to the flow of the fuel was approximately as large as the frictional resistance. In the recent development of engines, the frictional and flow losses increase very rapidly with speed. In recent designs with 10 to 11 meters per second piston speed, it is necessary to account for 0.6 kilograms per centimeter squared for overcoming the flow resistance and the same amount for the friction pressure. With an indicated pressure of 10 kilograms per centimeter squared there is then a mechanical efficiency of 94 per cent, or including the flow losses, 88 per cent.

*Report of the Deutschen Versuchsanstalt fuer Luftfahrt.*

### BEARING METALS

The Adhesion and Fatigue of Thin Coatings of White Metal Deposited on Mild Steel Surfaces, T. E. Stanton. (British) Aeronautical Research Committee—Reports and Memoranda No. 1424 (M. 74), December, 1930, 8 pp., 2 figs.

THE cracking of white metal bearings under service conditions and the possibility of improving the fatigue strength of the white metal were investigated at the National Physical Laboratory to find the effect of composition and method of application on the adhesion and fatigue of such coatings. Rings of S.14 mild steel were lined with white metal by various manufacturers and were subjected to a predetermined cycle of bending stress at a frequency of 3,000 per minute. Tests were also made on steel rings lined with lead bronze and supplied by the Allison Company of the United

States. A lead bronze lined ring and one lined with Richards A. C. E. white metal were tested for coefficient of friction at various temperatures and pressures. The initial adhesion of the white metal to the steel was also measured. A comparison of the behavior of white metal liners that had been cast, or centrifuged, was also made, and the distribution of the constituents of the white metal due to centrifuging was investigated.

Tests of the strength of the static adhesion of the white metal to the steel indicated that the adhesion was fully equal to the ultimate shear stress of the white metal. In the case of the steel rings lined with the lead bronze supplied by the Allison Company, no apparent deterioration in adhesion, and comparatively insignificant fatigue cracking of the liner, were apparent after 15,000,000 cycles of stress at a range of 18.9 tons per square inch. The performance of the lead bronze under forced lubrication and continuous rotation was indicated by the tests as being fully equal to that obtained from one of the best tin base alloys.

### PTERODACTYL

Some Features of the Earlier Pterodactyl Design, S. B. Gates and D. M. Hurst. (British) Aeronautical Research Committee—Reports and Memoranda No. 1423 (Ae. 514), June 15, 1931, 8 pp., 5 figs.

THE bearing of certain novel features of the earlier Pterodactyl designs on the observed peculiarities of their longitudinal motions, particularly in bumpy weather, was investigated. The earlier Pterodactyl has a small longitudinal moment of inertia, a small damping moment in pitch, and large wing tip controllers with a correspondingly large moment of inertia of the control system. It was suggested that the combination of small inertial and aerodynamic resistance to rotation with large inertia of the control system was likely to lead to the type of trouble experienced.

The calculations of stability with controllers gave suggested that the inertia of the Pterodactyl control is sufficient to bring it to the verge of instability even if the controller moments due to change in incidence and controller angle have the same relation as for an ordinary tail system. There are indications that this is not so, and that the aerodynamic properties of large tip controllers may of themselves lead to instability in the hands-off condition.

### TRACTOR AND PUSHER PROPELLER TESTS

Pressure and Force Measurements on Airscrew-Body Combinations, H. Buteman and F. C. Johansen. (British) Aeronautical Research Committee—Reports and Memoranda No. 1380 (Ae. 505), December, 1930, 62 pp., 10 figs.

THE present series of experiments has been carried out with the object of making detailed comparison between one tractor and two pusher propeller and body  
(Continued on following page)





**AT LAST!**

**A high-performing cabin amphibion  
for less than \$10,000**

**THE 1932  
PRIVATEER III**



**SPECIFICATIONS**

Top Speed ..... 120 m.p.h.  
 Cruising Speed ... 100 m.p.h.  
 Span ..... 42' 5"  
 Length ..... 30'  
 Height, on ground 11' 7"  
 Power: Continental  
     R-670 ..... 215 h.p.

New type Townend Ring, Heywood Injection Starter, Low Pressure Tires, Fuel Level Gauge, Tachometer, Oil Thermometer, Altimeter, Air Speed Indicator, Compass, Tools, Anchor, Rope, Fire Extinguisher.

**A**MPHIBIONS, INC., scoops the 1932 market . . . producing the first high-speed cabin amphibion selling for less than \$10,000. Conservatively speaking, the new PRIVATEER III will outperform any other single-engined amphibion in the country. Powered with Continental's latest—the 215 h.p. R-670—it does 120 m.p.h. And in appearance—it's a beauty. ¶ The business man, sportsman, flying school and commercial operator will find this up-to-the-minute three-place cabin amphibion made to order for his particular use. Aerodynamically it reflects the pioneering work of Amphibions, Inc., in the field of land-and-water aircraft. ¶ Utility is supplemented by comfort throughout. The well-appointed cabin seats three with ample head and leg room. The cabin is sound-proofed and equipped with adjustable ventilators, sliding windows, windshield wipers, dual controls, etc. A novel door arrangement provides easy entrance and exit from either side. ¶ The PRIVATEER III will appeal to the technical-minded. For instance, the simplified and automatic positive-action landing gear retraction. The non-corrosive hull structure, fabric covered. The new wing tip floats with shock absorber equipment. The insulated engine mount. The unusual visibility obtained by placing the pilot before the leading edge of the wing. ¶ Designed to meet a real demand, dealers will recognize the sales possibilities of this most modern of all cabin amphibions.

*Be sure to see it at the Detroit Show—Spaces 4, 6 and 8—Eastern Airway*

**A**MPHIBIONS, INC.  
 DEPT. AD4, GARDEN CITY, LONG ISLAND, N. Y.

(Continued from preceding page)  
 combinations. The influence of the propeller on the pressure distribution over the body was most marked in the neighborhood of the propeller and more noticeable in the forward pusher position where the propeller was appreciably distant from either extremity of the body. The variation of surface pressure with propeller thrust followed an approximately linear relationship. With each combination, a region of high negative pressure was observed near the tail at large propeller thrusts, constituting a spoiling effect.

In combination with a body of low resistance, tractor and pushers with the same proportion of spinner shielded had an equal overall maximum efficiency of 64.8 per cent. The forward pusher combination with larger spinner was least efficient. The maximum efficiency of the propeller blades alone was 72 per cent. With a body of high resistance, the pusher combinations were more efficient than the tractor (56.8 per cent), and of the two pushers, that having the smaller spinner shielding was the more efficient (61.6 per cent).

#### SCHEIDER TROPHY AIRCRAFT

Collected Reports on British High-Speed Aircraft for the 1927 Schneider Trophy Contest. Introduction by W. L. Cowley. (British) Aeronautical Research Committee—Reports and Memoranda No. 1300, January, 1931, 372 pp., numerous figures.

THE large amount of work carried out on the British scaplanes designed for the Schneider Trophy Contest of 1927 is given in this report. Three different types of machines are dealt with; namely, the Supermarine S-5 monoplane with a water-cooled engine, the Gloster IV biplane with a water-cooled engine, and the Short Crusader monoplane with a radial air-cooled engine. The research section of the report describes the work carried out both before and after the contest, and consists mainly of wind-tunnel tests. The superiority of the water-cooled engine for racing purposes was shown in the tests, but remarkable results were obtained in cowling experiments with the air-cooled engine. Drag and interference of the aircraft, projection of rivet heads, heat dissipation from the surface of wing radiators, floats, and propellers were also investigated.

The section devoted to specifications, design, and construction deals mainly with reports of the designers and constructors of the machines and engines. The third section contains certain reports on testing received from the Royal Aircraft Establishment. The metal monocoque fuselage of the S-5, two experimental sections of the Crusader wooden monocoque fuselage, and the static stability of the Gloster IV were tested.

The last section is concerned with work directly associated with flying or operating the machines. Operation of the S-5 at high angles of attack, the question of

cornering at high speeds, and test work of the High Speed Flight as well as an account of the contest itself are covered.

#### PROPELLER VIBRATION

A Contribution to the Dynamics of a Flexible Bar with Applications to the Propeller (Beitrag zur Dynamik des elastischen Stabes mit Anwendung auf den Propeller). K. Hildebrandt, Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 23, No. 2, January 28, 1932, pp. 37-43, 9 figs.

A QUICK procedure for determining the nodal points of upper vibrations of a flexible bar due to bending is outlined with applications to a propeller. The upper vibration frequencies may then be calculated as the fundamental vibration frequencies for a varied system by means of supplementary bearings at the nodal points. The value of the approximation is proved in several examples. The influence of the centrifugal forces on the bending vibrations of one rotating rod for a vertical axis on the center line is considered by calculating a boundary above and below the natural frequencies.

For an example corresponding to existing ratios for the metal propeller, the author gives the distribution of the r.p.m. at which the resonance vibrations of the ground tones and the first harmonics occur. He shows that in application to engines of more than five cylinders upper vibrations may also be excited.

#### AIRPLANE CONTROLS

A Collection of Wind Tunnel Data on the Balancing of Controls, F. B. Bradfield. (British) Aeronautical Research Committee—Reports and Memoranda No. 1120 (Ae. 541), May, 1931, 16 pp., 25 figs.

THE results of a number of tests made at the Royal Aeronautical Establishment from time to time in regard to the balance of control surfaces are included in the data given. The use of servos is closely related to the question of balance, and a section has been added to the report on servo controls. The Frise balance is a variation of the set-back hinge balance, applicable to ailerons, in which the nose of the control surface is not symmetrical. This type of balance is considered separately. Other sections of the report cover the all-moving control surface with set-back hinge, the control flap behind a fixed surface with set-back hinge and also with a horn balance.

#### DRIFT FROM ENGINE TORQUE

Drift Due to Engine Torque, L. J. Wackett. Aircraft Engineering, Vol. 4, No. 36, February, 1932, pp. 32-33, 41, 4 figs.

SOME experiments are described which confirm the theoretical view of the importance of the effect of engine torque on the navigation of an airplane. The author explains that due to the fact that the air flow in the slipstream is helical in nature, there is a torque reaction on the whole aircraft which must be overcome by an equal and opposite moment produced by an asymmetrical distribution of air forces on the airplane as a whole.

He points out that these torque effects are very marked in small aircraft with high power, and particularly when the propeller is slow running and when the speed is low at take-off or in climb. He discusses also the effect of this torque on fighting airplanes with fixed guns, in which case an error arises when the gun is set parallel to the fore and aft axis. He suggests further experiments to determine the drift due to torque.

#### HEAVY-OIL ENGINES

The Actual Position of the Problem of Light Fuel-Injection Engines for Aeronautics (L'Etat actuel de la question des moteurs legers a injection pour l'aeronautique). G. Delanghe. Bulletin Technique de Bureau Veritas, Vol. 14, No. 2, February, 1932, pp. 51-56, 5 figs.

THE author believes that the advantages he enumerates for the heavy-oil engine for aircraft fully justify the considerable amount of work involved in developing such an engine for aviation purposes. He describes in detail the Clerget heavy-oil, Packard Diesel, and Junkers two-cycle Diesel engines, and discusses more briefly the Fiat AN-1 fuel-injection engine which has been developed from the gasoline engine of that make and the Garuffa, both Italian developments, the Sunbeam Coatalen, which is distinguished principally by the fact that it has only one pump for all the cylinders; oil engines developed at Farnborough and at the Beardmore plant in England, and the Bristol fuel-injection engine. He also outlines the studies of Ricardo in the development of the light Diesel engine.

#### ALUMINUM-CHROME ALLOYS

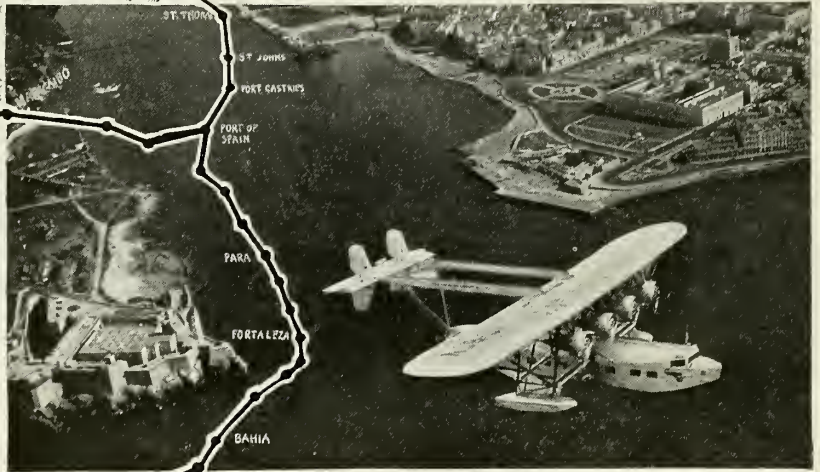
Aluminum-Chrome Alloys (Leghe alluminio-cromo). G. Gallo and G. Fragnane. L'Aeronautica, Vol. 11, No. 12, December, 1931, pp. 1539-1554, 12 figs.

THE resistance of aluminum alloys to corrosion was investigated for this report, the Toedt apparatus being employed. Aluminum alloys with a chromium content variable between zero and six per cent were prepared, and the solidification curve, microscopic structure, hardness, and resistance to corrosion in salt water were determined. Similar research was undertaken on duralumin-chrome alloys.

It was found that a chromium content of less than two per cent was sufficient to increase noticeably the hardness and resistance to corrosion of aluminum-chrome alloys. With duralumin, however, the addition of chromium diminished the mechanical properties to a great extent, but did not diminish its corrodibility in salt water. The authors consider that this may be explained by the great distance between aluminum and copper in the series of electrolytical potentials of the various metals, and therefore when duralumin and copper are combined, the protective action which chromium exercises on pure aluminum is nullified.



Pan American Airways—The Merchant Marine of the Air—covers 20,166 miles of airways and links thirty-one countries and colonies of the Western Hemisphere to the United States. This necessitates 13,000 miles of over-sea flying, 600 of which is non-stop across the Caribbean Sea.



The American Clipper arrives at Havana two hours after leaving Miami

## Pan American has an "on-time" arrival record of 99.62%

The 102 multi-motored, radio equipped, passenger, mail and express airliners in the Pan American Fleet serve ninety-four airports and seaplane bases. There are fifty-six private ground radio and weather stations. To date, operations cover 29,000,000 passenger miles flown; 104,000 passengers carried; 5,300,000 pounds of air mail and cargo transported with an "on time" arrival record of 99.62%.

The flagships of the fleet are the giant Sikorsky S-40's, American Clipper and Caribbean Clipper. These are the largest ships of the kind in regular service on any air line. They carry forty-five passengers and a crew of five. Each ship is powered by four Pratt & Whitney Hornet engines.

Pan American covers one of the most interesting airways in the world. Its ships are called upon to do almost miraculous things. They must fly from water level to more than mountain heights. They must top the Andes and undergo a temperature change of from 90° above to 30° below zero—120 degrees—in one hour. In all flying operations perfect spark plug performance is vital—that's why Pan American uses B. G. Mica Aviation Spark Plugs.



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# FAIRCHILD "24" CABIN AIRPLANE

**I**N addition to the Fairchild "22," the Fairchild "24," a two-place, side-by-side cabin plane, is now being produced by the Fairchild Aviation Corporation. The new model, powered with a 95-horsepower Cirrus Hi-Drive engine, has approximately the same general performance as the open type "22." The ship is designed for the private owner and for student training. Dual controls are standard equipment.

The cabin measures 40 inches in width at the seats. Two people with parachutes or heavy clothing can sit side by side without crowding or interference. The instrument board, which extends the full width of the cabin, has the following as standard equipment: Air speed indicator, altimeter, tachometer, oil pressure gauge, oil temperature gauge, and ignition switch.

The inverted in-line engine permits the pilot to sit far above the cowling line and also to see the ground ahead of the plane by looking slightly to either side. The windshield is of the V type, and the roof above the pilot, fitted with Cellon. To provide maximum visibility, the wings are tapered near the point of attachment to the fuselage; this has the effect of bringing the pilot ahead of the leading edge of the wing. A large door is provided on either side of the fuselage, permitting easy access by the pilot or passenger without interference with the other. Hand-operated sliding windows are provided in both doors.

Control sticks are mounted on a torque tube, supported by two split cast alumi-

num bearings attached directly to the fuselage structure. The aileron torque tube runs at right angles to the elevator torque tube and is controlled by a ball joint which allows freedom of movement in all directions.

Rudder controls are of the pedal type, mounted on two torque tubes attached to the fuselage structure by ball bearings and connected to the rudder by cables. Both rudder and stick control are easily disconnected when not used for instruction purposes. The stabilizer adjustment crank is in a convenient position overhead.

Tail surfaces, with the exception of the fin, are of steel tube construction, covered with fabric. Elevators and rudder are jugged for interchangeability. The main upright support of the fin is built up of wood and bolted to a specially designed channel which forms the tail post of the fuselage. The high aspect ratio of the tail surfaces combines with the large ailerons to produce flight characteristics that are unusually smooth and effective, even at speeds below stalling.

The landing gear is of the split-axle type with an unusually wide tread of nine feet two inches; this makes the plane easy to taxi, in addition to giving it steadiness in one-wheel or cross-wind landings. The shock absorbers are of the oil and spring type, having a total travel of eight inches, the first six inches being cushioned on oil alone.

The wing section is the N-22. Ailerons are constructed of metal, and the unusual torsional stiffness permits the use of con-

trol rods attached to their innermost ends. Ailerons extend the full length of the effective wing area, are interchangeable and supported at the fuselage by self-aligning ball bearings. Bellcranks, wires, and pulleys have been eliminated.

A full-swiveling 10 by 3 pneumatic tail wheel is provided, fitted with a spring and set at an angle to keep the wheel always in trailing position.

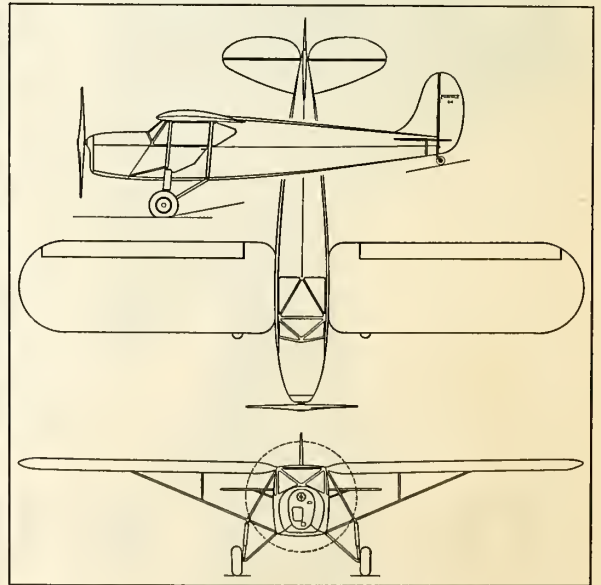
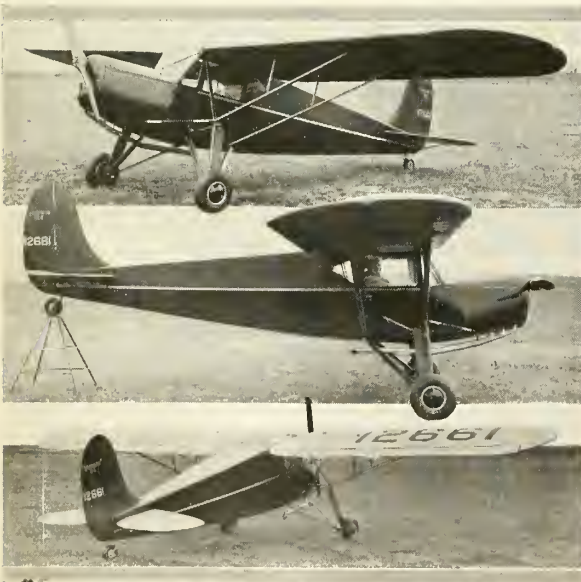
The American Cirrus engine is a four-cylinder, air-cooled, inverted in-line type. Gasoline is carried in two 12-gallon tanks located in the wing and is fed by gravity to the carburetor. A shut-off valve on the fire-wall is controlled from the instrument board. Visible direct-float fuel gauges are standard equipment. The tanks are made of welded tennplate, which is easy to repair in the field if necessary.

An Air Propellers, Inc., wooden propeller, designed especially for the Fairchild "24," is standard equipment.

The performance figures following are those determined with full load:

## Specifications

Wing span.....	35 feet 8 inches
Wing chord.....	5 feet 6 inches
Wing area (including ailerons)....	170 sq. ft.
Length overall.....	23 feet 2 inches
Height overall.....	.7 feet
Weight, empty.....	1,030 pounds
Gross weight.....	1,600 pounds
Useful load.....	570 pounds
Wing loading....	9.4 pounds per square foot
Power loading....	18.8 pounds per horsepower
High speed.....	115 miles per hour
Cruising speed.....	95 miles per hour
Landing speed.....	42 miles per hour
Climb at sea level.....	700 feet per minute
Service ceiling.....	12,000 feet
Cruising range (24 gallons).....	350 miles



The two-place Cirrus-powered Fairchild "24" cabin plane and three-view scale drawings showing its general outlines

# SAFETY... SPEED... and Reliability



## ... the keynote of BELLANCA 1932 TRANSPORT PLANES

THE Bellanca planes on exhibition at the National Aircraft Show in Detroit are further evidence that Bellanca engineers understand the problems of today's transport business.

The new Airbus and Skyrocket models at the Show are fast planes! Their speeds are higher than the requirements of the airline operator of sound judgment. Airline executives express complete satisfaction with Bellanca planes for speed operations. These men are influenced, as well, however, by the many other factors that stand back of the Bellanca reputation.

There are such considerations, for example, as reliability and safety. The eminent, established efficiency of Bellanca planes—their structural sturdiness—and their new features of serviceability—all enter into the economy with which they are invariably operated. Bellanca economy goes further than first cost—it carries right through the life of the plane, a factor of prime importance to the airline of today.

### THE AIRBUS TRANSPORT

Twelve place transport (pilot's compartment separate).  
Walls of Bakelite, washable.  
Seats genuine leather, dark green, wearable and easily cleaned.  
Windows raise and lower  
Cabin altimeter and air speed indicator visible to passengers.  
Block design linoleum floor, washable.  
Complete toilet facilities.

### THE SKYROCKET TRANSPORT

Six place cabin.  
Upholstered in Fabrikoid, washable.  
Large baggage compartment, accommodating bulk as well as weight.  
Bonded for radio.  
Night flying equipment.  
This plane is in every sense a reliable high-speed transport.

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# BELLANCA

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New Castle, Delaware

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# GUIBERSON 185-H. P. DIESEL ENGINE

**A**FTER more than three years of intensive research and development, a new air-cooled nine-cylinder four-cycle radial type Diesel engine is now in production by the Guiberson Diesel Engine Company of Dallas, Texas.

The Guiberson company is a subsidiary of the Guiberson Corporation of Dallas, manufacturers of oil well equipment in that city for the past thirteen years. The new company has been organized to develop and manufacture oil-burning engines for airplanes and automobiles.

S. A. Guiberson, Jr., head of the company, investigating the Diesel principle as applied to a compact, high-speed pump unit, found possibilities in the conception of the Diesel principle as adapted to aviation requirements in a design of variable control and constant pressure worked out by Fred Thaheld, an Austrian aeronautical engineer.

Before work was begun on the airplane engine, the company's patent attorney directed the investigation of over 3,000 patents to insure originality of design. More than fifty claims were allowed by the patent office. Early in 1929 the resources of the Guiberson plant were turned over to Thaheld, who with C. S. Crickmer, chief engineer of the Guiberson organization, began work on the first engine. After a thorough workout of the first test engine under the direction of C. C. Spangenburg, chief testing engineer, and Allen Guiberson, head of the aviation

department of the company, a number of refinements of design were incorporated, and last November official test runs of the engine were completed by the Department of Commerce; the engine was rated at 185 horsepower and awarded A. T. C. 79. The engine operates at peak efficiency, whether idling or wide open. The 185-horsepower engine weighs 510 pounds, or 2.75 pounds per horsepower, which approximates the weight of the modern gasoline engine of the same rating.

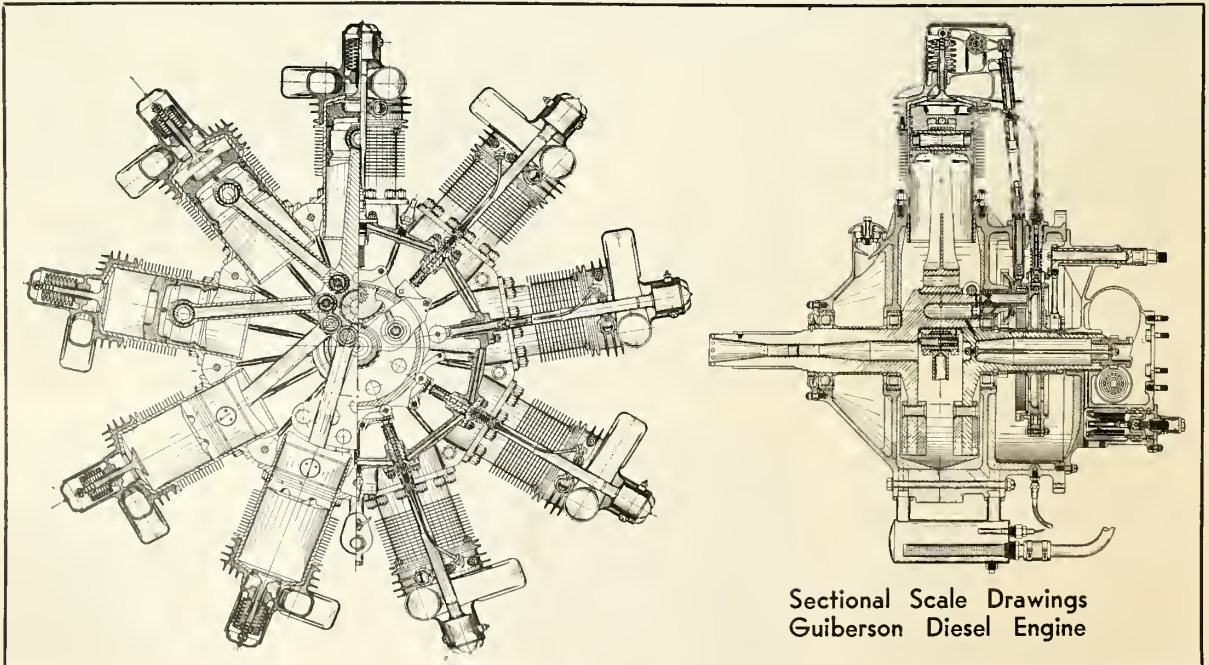
The principal patent of Thaheld's design is the variable fuel control system, which is simple in its construction and operation. By means of one control the stroke of the pump is varied as the time of the injection is advanced or retarded. The duration of the injection is changed in proportion to the amount of fuel injected, and the time of injection is altered by moving control to the extreme position below idling; the compression is released by the decompression ring attached to the main control plate, allowing the propeller to turn freely. Through decompression, the propeller is allowed to turn freely in a glide with the engine dead, and from a normal gliding angle the engine may be started again by merely advancing the throttle.

The valve cam is mounted in the conventional manner on the crankshaft in the rear case and driven by an intermediate gear opposite crankshaft rotation

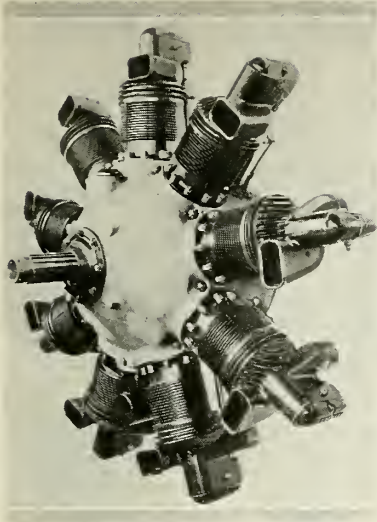
at one-eighth crankshaft speed. The four valve lobes are exceptionally long, as the valve action is somewhat different from the standard practice. Only one valve is used for both the scavenging and intake stroke; therefore, the valve lobe holds the valve open for a period of 440 degrees of crank travel.

The fuel cam is integral with the valve cam. Following the fuel cam path are nine pump levers, each having a roller on the outer end that rides the face of the cam. These levers are mounted between the main control plate and decompression ring, controlling the pump stroke over the advance range as the main control plate is moved opposite to the rotation of the cam. This position is toward maximum advance and maximum stroke.

To retard the injection and shorten the stroke it is necessary only to move the control plate with the pump lever in rotation with the cam. At full throttle, the plunger lift is .057 inch. The injection starts at 48 degrees before top center and ends 25 degrees before top center with a duration of 23 degrees. This setting has a pump plunger velocity of 24.7 inches per second, and the duration of the injection occurs in .00207 second at 1,925 r.p.m. At the idling setting of .015 inch, lift of the plunger starts at 11 degrees before top center and ends two degrees after top center, a duration of 13 degrees at 400 r.p.m. in .00542 second. This makes



Sectional Scale Drawings  
Guiberson Diesel Engine



Guiberson 185-h.p. Diesel engine

it possible to control to a large extent the maximum cylinder pressures.

The decompression ring, unitly controlled with the control plate, rides between the fuel and valve cam, having nine small lobes that engage each valve cam follower lifter under the inner end, lifting all the valves open at the same time. To put the engine on decompression it is necessary only to move the control plate to the extreme in rotation with the cam; while in this position the fuel is cut off.

The control, mounted through the accessory case, has an eccentric connected by a link to the main control plate. To maintain a given r.p.m. or decompression it is necessary only to move the control to the right or left to shift the main control plate to the desired position.

Fuel pumps are mounted in the rear case in line with the pump lever, and the fuel is supplied through drilled ducts. This brings the fuel to case temperature, which is beneficial in handling lower gravity fuel in cold weather, and eliminates the possibility of fuel leaks. Check valves in the head of the fuel pump allow fuel to pass into the fuel line, which is made up of steel nipples and high-pressure copper tubing. This check stops any return of fuel or air from the compression or explosion pressures in the cylinder.

The open type injector, which atomizes the fuel into the combustion chamber, is composed of three parts—the injector body, fuel pindle, and spray nozzle, all easily dismantled for inspection or cleaning. The fuel pindle is inserted in the spray nozzle and has three .0156-inch grooves in its tapered end to converge the fuel directly to the .020-inch hole in the spray nozzle. The velocity of the fuel at full throttle through this orifice is approximately 807 feet per second and

requires a pressure of 2,000 pounds.

The concentric head of the piston is relieved to coincide with the injector and allow the fuel spray to penetrate into the combustion chamber. The single valve is centrally located, and the sinuous manifold, so designed as to cause the air to enter the cylinder in a whirling spiral motion on the suction stroke. The concentric head of the piston adds to this turbulence during the compression stroke. Fuel is so injected into this turbulence within the cylinder that the spray leaves slight deposits, showing a spiral within the piston head pocket. After many hours of operating at different speeds, no appreciable amount of carbon formed.

The sinuous manifold and valve port are designed to give maximum air turbulence to the intake stroke and at the same time overcome the escape of exhaust gases through the front of the engine. The intake port (opening forward and receiving the air) is flared and set at an angle which utilizes the maximum pressure of the slipstream. The exhaust port is to the rear and on the opposite side of the cylinder head; this was necessary to design the proper curve into the throat, or bypass opening, to force the exhaust gases through the exhaust port. The air flow is continuous through the port until the exhaust gases are expelled; then the velocity through the throat and around the vertical baffle is increased. As soon as the gases are started rearward, the intake stroke draws fresh air with its increased velocity around the baffle into the cylinder in a swirl.

The crankshaft, master rod assembly, and crankcase are of the conventional design used in radial aircraft engines with an increase from seven to ten per cent in weight to insure a safety factor over the increased loads and pressures encountered in Diesel power. The engine operates with a compression pressure of 460 pounds, and the explosion pressure is well under 1,000 pounds. Vibrations over the operating range are not greater than those encountered in other radial aircraft engines.

There is but little friction to be overcome in the operation of the throttle, and while acceleration is rapid, it is not critical.

Early this year the company produced a 240-horsepower Diesel engine, following the design of the present model. This will be given its official test immediately after the Detroit show. The 240-horsepower engine weighs a total of 540 pounds, or 2¼ pounds per horsepower.

**Specifications of 185-H.P. Engine**

**Crankcase:** Aluminum alloy barrel, split type, consisting of crankcase and accessory case in three pieces.

**Crankshaft:** Forged chrome nickel steel, two-piece construction with counterweights bolted.

**Master rod:** One-piece H forgings, nickel chrome steel, having removable steel-backed bushings.

**Link rods:** Tubular forged nickel chrome steel, bronze bushed.

**Pistons:** Aluminum alloy, full skirt

**Cylinder barrel:** Forged chrome nickel steel, integral dome with aluminum alloy head screwed and shrunk on; attached to crankcase with studs.

**Piston rings:** Two compression rings and one oil-regulating ring above pin and one oil-regulating ring below pin. Ring size, 4.8125 by .1875 inches.

**Fuel pumps:** Independent plunger type mounted in the crankcase adjacent to each cylinder in a position above the cam; connected to the injector by high-pressure tubing.

**Fuel circulating pump:** Type C-5 built in as standard equipment.

**Propeller hub and propeller drive:** Conventional S. A. E. 30 splined shaft, direct drive.

**Valves:** Single high chrome silicon steel, Thompson valve for each cylinder, used in connection with special passages for inlet and exhaust.

**Valve mechanism and operation:** Push rod and rocker arm with roller over valve stem at valve end; clearance adjustment on opposite end of rocker arm.

**Valve springs:** Two-spring arrangement. **Crankshaft bearings:** Two roller main bearings at the center; one deep groove ball thrust bearing at front end; rear crankshaft bushing in accessory case.

**Oil pump:** Two sections, scavenging and pressure. Oil pressure, 70 pounds.

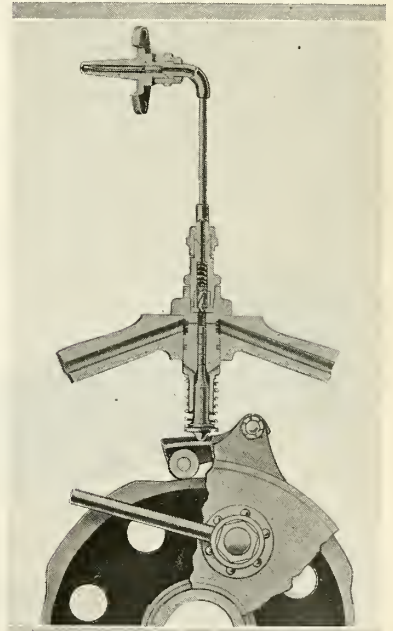
**Starter:** Series 7 Eclipse electric inertia.

**Generator:** Twelve volts.

**Tachometer drive:** Standard S. A. E., half engine speed, counter-clockwise.

**Data**

Rated horsepower.....	185 at 1,925 r.p.m.
Weight.....	510 pounds
Weight per horsepower.....	2.75 pounds
Outside diameter.....	46.125 inches
Overall length.....	34.187 inches
Bore.....	4.182 inches
Stroke.....	6 inches
Displacement.....	982 cubic feet
Consumption (max. r.p.m.)	11.5 gals. per hour
Consumption (cruising).....	8.5 gals. per hour



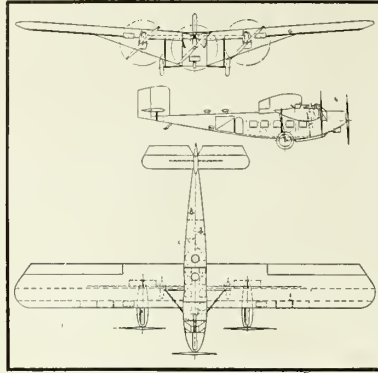
Guiberson fuel injection mechanism

# GERMAN TRANSPORT AIRPLANES

(Part VII Concluded)

ROHRBACH

Edwin P. A. Heinze



Rohrbach Roland Transport Plane

**R**OHRBACH airplanes constructed prior to 1928 were described in the previous installment of this series of articles; these included the multi-motored landplane of Rohrbach, built in 1920, and the *Robbe* and *Rocco* flying boats, which were the forerunners of the types which are now described.

## Romar

The *Romar* series, of which the first boat appeared in 1928, was designed to the order of the Lufthansa for long-distance speed work. The Lufthansa purchased three of these ships at a time when it was contemplating the inauguration of a South American service. A fourth machine of this type has been built for the French navy and is stationed at a Mediterranean port.

The *Romar* has a hull length of 72 feet, a wing span of 124.3 feet and a wing area of 1,830 square feet. The hull has two steps and seating accommodation for twelve passengers in two cabins, and has room, in addition, for a crew of four. Behind the collision bulkhead is the wireless room. The next compartment has two floors. On top is the pilots' cabin with a seat on each side and one in the middle behind them, reserved for the engineer. The room beneath contains auxiliary engines for the sea-water pump and a wireless generator. Then follows a four-passenger cabin connected by a gangway on one side with an eight-passenger cabin. A door from the gangway leads into the lavatory. To the rear of the larger cabin is the hatchway, behind which is a luggage hold.

The *Romar* boats are equipped with three engines, the central one above the hull being located a short distance in front of the others. The ship is provided either with three B. M. W. VI engines of 500 to 750 horsepower output each or with the B.M.W. VII engines delivering 600 to 750 horsepower each. With the B.M.W. VI engines, the ship has a maximum speed of 123 and a cruise-

ing speed of 113 miles per hour, while with the other engines the respective speeds are 137 and 126 miles per hour.

The *Romar I* with the B.M.W. VI engines weighs fully equipped (empty) 25,675 pounds and will take a load of 14,100 pounds, so the gross flying weight is 39,775 pounds. The load to weight ratio of the second type *Romar* is considerably better, since the ship weighs only 24,640 pounds and has a carrying capacity of 18,635 pounds, making the total flying weight 43,275 pounds.

## Rostra

The last in the line of Rohrbach flying boats for civilian transport work is the *Rostra* with two Gnome et Rhone *Jupiter VI* air-cooled engines, delivering 400 to 525 horsepower each. This ship has been especially designed for express transport and has a span of 86.3 feet and supporting surface of 958 square feet. The hull measures 53.8 feet in length,

and the overall height of the ship is 14.7 feet.

The pilots' cabin for two persons is situated immediately behind the collision bulkhead. A lavatory is also provided. Two sets of wireless apparatus are furnished, with a telescopic mast that can be cranked up when the ship is afloat.

The *Rostra* weighs, empty, 10,715 pounds and has a full flying weight of 16,720 pounds. The ship has a cruising speed of 110 miles per hour and a maximum speed of 127 miles per hour.

## Roland

The first civilian transport plane produced by the Berlin Rohrbach company, in addition to the *Robbe I*, was the landplane, *Roland*. The Lufthansa purchased sixteen, some of which have done constant service on international lines for five years.

The *Roland* is built entirely of duralumin. The fuselage is drawn low down to the ground and consists of a framework with smooth duralumin skin, the body having rectangular section. The interior of the cabin is spacious and without impeding projections. The cockpit, which, as in the flying boats, is entirely covered with glass, is arranged high up, immediately behind the middle engine in the nose of the fuselage, and steps lead down to a door into the passenger cabin. This cabin has ten seats, each with a large sliding window at its side. The front seat on the right is reserved for the wireless operator, the apparatus being built into the cockpit wall. The entrance to the cabin is at the back on the right side, and opposite it is the lavatory. Hot air heating is furnished, and two emergency exit manholes are provided in the ceiling.

The wing has the characteristic Rohrbach box spar, but leading and trailing edges are parallel, braced against the fuselage by a strong double wire cable on each side. The *Roland* has three B.M.W. V six-cylinder water-cooled engines, developing 320 to 360 horsepower each. The wing engines are supported in duralumin brackets attached to the spar. The fuel tanks form part of the wing nose and are situated between the wing engines and the wing tips. The radiator of the central engine is secured to the fuselage below the engine support, while the radiators of the side engines are located under the leading edge of the wings on the sides of the engines away from the fuselage.

The empennage is designed as in the flying boats, and the control connections to them are conducted entirely within the fuselage.

Inclusive of its equipment the *Roland* weighs 11,265 pounds and has a loading

(Continued on following page)



Trimotored ten-passenger Rohrbach Roland used by the Lufthansa





*You wear only the harness.  
The seat cushion is your Chute.*



*Click! Click!! Only two seconds to snap  
the quick-connectors. . . .*



*. . . and your Switlik Safety  
Chute is ready for you to use.*

**A new, improved  
SAFETY  
CHUTE  
A new Low Price**

**S**WITLIK steps ahead once more. This time with an improved type Quick-Attachable Back or Seat Pack. ¶ You wear only the soft, comfortable harness. Your back or seat cushion is the standard Switlik Safety Chute. In case of emergency—click!-click!! It takes only two seconds to fasten the two attachment clips. ¶ Switlik's new Safety Chute differs from other Quick-Attachable parachutes which fasten to the chest in that it eliminates the danger of injury to the face from the shroud lines during opening. The Switlik Quick-Attachable Chute is standard in this respect, opening up and over the back.

**WHITE SILK**  
*Including Quick-Attachable Models*  
**\$275**  
*(Former prices, \$300 and \$325)*

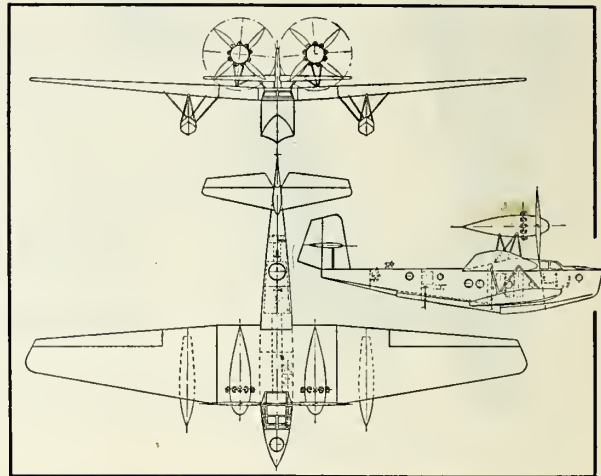
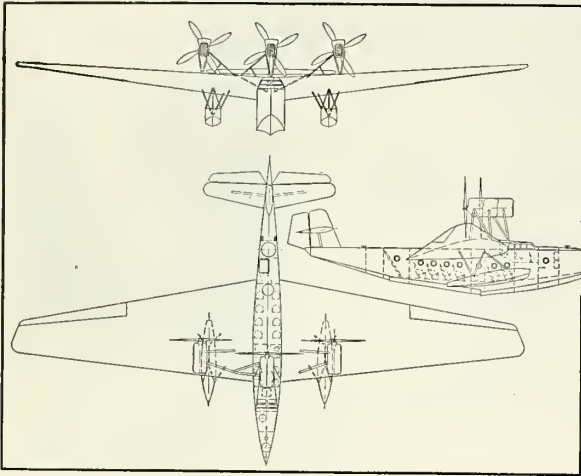
**PONGEE SILK**  
**\$225**  
*(Former prices, \$240 and \$265)*

*With these generous price reductions, you can buy an all White Silk Quick-Attachable Safety Chute for less than the former cost of a Pongee Chute.*

Also, it utilizes the standard four-point suspension, where other similar types provide only two. ¶ The rip cord also is standard. Part of the Chute, it is conveniently located on the connector web, in the standard location and accessible under all conditions. It pulls in direct line with the protector housing, thereby eliminating right angle removal of the rip cord handle. ¶ The harness of the Switlik Quick-Attachable Back or Seat Pack is equipped with a patented back pad which holds the harness in usable position at all times and acts also as a comfortable cushion.

**SWITLIK**  
**PARACHUTE & EQUIPMENT CO.**  
Broad and Dye Streets      Trenton, New Jersey

**SEE IT FOR THE FIRST TIME AT THE NATIONAL AIRCRAFT SHOW**  
*Also, Switlik's new Cabin Chair Chute, detachably connected to the back of chair. Truly, an innovation in parachute design.*

Rohrbach *Romar* with three B.M.W. water-cooled enginesRohrbach *Rostra* with two *Jupiter* air-cooled engines

capacity of 5,455 pounds, the flying weight being 16,720 pounds. The ship has a cruising speed of 109 miles per hour, while the maximum speed is 132 miles per hour.

#### General Performances

The Rohrbach *Robbe I* normally takes a fuel supply of 158 gallons and  $9\frac{1}{4}$  gallons of oil, while the *Rocco* takes 1,000 gallons of fuel and 61 gallons of oil, with which she will cover a distance of 1,120 miles with a pay load of 1,100 pounds. With the same load, the *Romar I*, which holds 2,050 gallons of fuel and 106 gallons of oil, will cover 1,800 miles, while the *Romar II*, with a similar load and 2,085 gallons of fuel and 106 gallons of oil, will travel normally 2,520 miles. The tanks of the *Rostra* will hold 625 gallons of fuel and 50 gallons of oil, and with the same load, she will cover a distance of 1,000 miles. The *Roland*, with a pay load of 2,200 pounds, 412 gallons of fuel and 22 gallons of oil, will travel normally 900 miles.

Except in the case of the *Roland*, the pay loads mentioned are not the normal ones. The *Rocco* will take 2,068 pounds; the *Romar I* will normally transport 2,200 pounds, and the *Rostra's* normal pay load is 2,445 pounds.

#### Summary

This completes the description of German transport planes. Before closing this series of articles, however, it may be of interest to make some comments on the data we have covered, in order to obtain an idea of the relative efficiency of the various types of planes.

Besides speed of transport, the most important demand, both from the operator's and the passenger's point of view, is economy of transport, since its lack means high operation costs and consequently high fares and freight rates. The airplane capable of carrying the greatest load for each horsepower its engine or engines deliver in flight will manifestly be the most economical as regards pure operation costs. And if it is faster than an otherwise similarly economical plane, it will have to be regarded as the more efficient of the two. Comparing planes from this point of view alone does not, unfortunately, give an altogether fair estimation, as no account is taken of the initial price, the maintenance costs and the amortization. To consider all these points would require analyzing the working accounts of every machine over a long period and a calculation of average results. This, of course, would far

exceed the scope of this magazine. By confining ourselves to regarding merely the economy of operation and transport speed, two of the most important factors, a sufficiently accurate basis of comparison may be obtained.

Throughout the articles the normal output of the power plant has been given, because there is a greater difference between the maximum and normal outputs of air-cooled engines than of water-cooled engines. Using the maximum output as a factor, the results would favor water-cooled engines which, with the same maximum output as air-cooled engines, have a higher constant output than these during normal speed. In other words, to carry the same load they would be using more power, while the pounds per horsepower figure would be the same in both cases. As air-cooled engines generally consume slightly more fuel than water-cooled, this difference would probably have but little effect upon the actual results. But that being by no means certain, the author considered it fairer to employ the normal output figure as a standard. In considering the figures given, it should be remembered that the engines draw the weight of the machine in addition to the total load.

# The PILGRIM 100-A TRANSPORT AIRPLANE



The PILGRIM 100-A, ten place transport airplane is a complete transport unit, ready for immediate service and fully equipped with two-way radio telephone, and radio beacon receiver . . . full night flying equipment . . . toilet and lavatory . . . heating and ventilating system . . . 47 cubic foot mail compartment . . . 25 cubic feet of baggage compartments . . . all incorporated into the design and built in at the factory for greatest satisfaction.

RANGER Airplane Engines are built in five models, from 120 to 400 horsepower. All are INVERTED and AIRCOOLED. The RANGER line includes geared and direct drive, supercharged and direct induction engines, in 6 cylinder inline and 12 cylinder Vee types. All combine the smoothness of operation inherent in this arrangement, plus the complete inclosure of all working parts, and positive force feed lubrication throughout.

The many advantages offered by these up-to-date developments are fully described in illustrated folders which will be sent upon request.

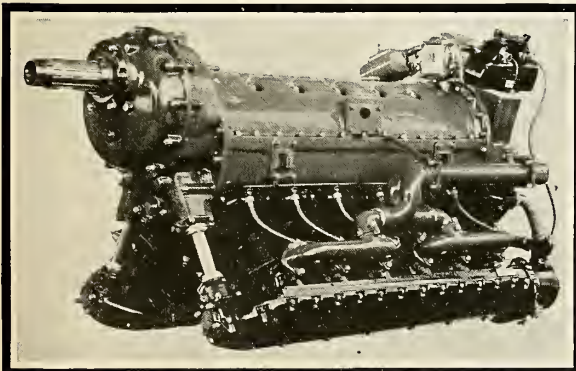
The PILGRIM Airplane and RANGER Engines will be displayed at the National Aircraft Show in Detroit, April 2nd to 10th.

## AMERICAN AIRPLANE & ENGINE CORPORATION

Manufacturing Division of the Aviation Corporation

FARMINGDALE, L. I., N. Y.

Manufacturers of PILGRIM AIRPLANES and RANGER Engines



RANGER V-770 S. G. GEARED and SUPERCHARGED 400 H. P.

# The RANGER INVERTED AIRCOOLED AIRPLANE ENGINE

# RECENT AERO PATENTS

**T**HE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N.W., Washington, D. C., at the rate of 20c each. State patent number and inventor's name when ordering.

Adjustable pitch propeller. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co. (1,842,765)

Aeronautical propeller. Sylvanus A. Reed, New York, N. Y., assignor to Reed Propeller Co. (1,842,766)

Fluid strut. Boris Bogoslawsky, Stamford, Conn., assignor to Sikorsky Aviation Corp. (1,842,776)

Flying boat hull and the like. Grover Loening, Mill Neck, N. Y., assignor to Grover Loening Aircraft Co., Garden City, N. Y. (1,842,791)

Aircraft. Rossiter S. Scott, New York, N. Y. (1,842,846)

Hydroplane. Rene A. A. Couzinet, Levallois-Perret, France. (1,842,858)

Compensating device for rudder and elevator controls of airplanes. Rene A. A. Couzinet, Levallois-Perret, France. (1,842,859)

Automatic stabilizer for airplane control levers. Hervey M. Salisbury, Walnut Grove, and Arthur E. Miller, Sacramento, Calif. (1,842,952)

Airplane engine. Vernon D. Speer, Cedar Falls, Iowa. (1,843,003)

Propeller hub and lock. Roscoe A. Coffman, Hollywood, Calif. (1,843,206)

Aircraft truss support. Harold D. Hoekstra, Glendale, Ohio. (1,843,364)

Aerial delivery apparatus. Samuel M. Coffman, Kansas City, Mo. (1,843,597)

Airplane part. Raymond J. Norton, Washington, D. C., assignor to Bendix Brake Co., South Bend, Ind. (1,843,621)

Elevated airport. Walter H. Jackson, Summit, and William H. Dusenbury, Bogota, N. J. (1,843,640)

Aeronautical device. Wilbur R. Kimball, New York, N. Y. (1,843,643)

Airplane. Marcel Jannin, Meudon, France. (1,843,676)

Combination control apparatus for flying and other controls for airplanes. Jean Quessette, Le Mans, France. (1,843,734)

Propeller. Harry H. Semmes, Chevy Chase, Md., assignor to American Propeller Co., Baltimore, Md. (1,843,886)

Airplane. Thomas M. MacCaskie, Chicago, Ill. (1,843,926)

Airplane wing. Edward A. Stalker, Ann Arbor, Mich. (1,843,993)

Wheel for airplanes. Julius Mozni, Detroit, Mich. (1,844,100)

Airplane landing gear. Frank Short, Poughkeepsie, N. Y. (1,844,186)

Variable-pitch propeller. Valance H. Patriarche, Winnipeg, Manitoba, Canada. (1,844,227)

Landing gear for aircraft. Raymond G. Perry, Ottawa, Ontario, Canada. (1,844,295)

Airplane. William Sramek, New York, N. Y. (1,844,448)

Holding and releasing device for airplanes. George W. Hoover, Jr., Washington, D. C. (1,844,506)

Mounting for aircraft engine. Hiram C. Ottwell, San Francisco, Calif. (1,844,521)

Airplane landing gear. William J. Chievitz, Canton, Ohio, assignor to Timken Roller Bearing Co. (1,844,540)

Parachute trap. Sigurd R. Peterson, Detroit, Mich. (1,844,594)

Aircraft, including pedals for same. Igor Sikorsky, College Point, N. Y., assignor to Sikorsky Aviation Corp. (1,844,607)

Aircraft, including engine-mounting frame for same. Igor I. Sikorsky, assignor to Sikorsky Aviation Corp. (1,844,608)

Gun-mount for airplanes. Alexander Allan, Middletown, and William H. Innes, Newport, R. I. (1,844,625)

Airplane safety device. James E. Bradley, Chicago, Ill. (1,844,740)

Dirigible construction. Herbert M. Jackson, Omaha, Neb. (1,844,765)

Multihelix (horizontally disposed, variable-pitch propeller). Erik S. Nelson, San Francisco, Calif. (1,844,786)

Aviator's garment. Marie Popelakova, Prague, Czechoslovakia. (1,845,099)

Airplane engine. William Dieter, Newark, N. J. (1,845,136)

Airplane landing light. Samuel W. Hyatt, Connerville, Ind., assignor to Indiana Lamp Corp. (1,845,153)

Aircraft. Herman L. Prinz, Chicago, Ill. (1,845,184)

Landing gear for dirigible airships. Alfred Bradshaw, Drumheller, Alberta, Canada. (1,845,229)

Airplane. John W. Duke, Philadelphia, Pa. (1,845,251)

Aircraft. John S. Maxwell, Ocean Beach, Calif. (1,845,307)

Tail wheel. Claude Sauzedde, Detroit, Mich., assignor to Detroit Hydrostatic Brake Corp. (1,845,345)

Airplane. Henry E. Kingsley, Chicago, Ill. (1,845,420)

Airplane. Richard N. Williams, Norfolk, Va. (1,845,466)

Airplane. Clark Robinson, New York, N. Y. (1,845,520)

Multi-powered airplane. Adolphe C. Peterson, Minneapolis, Minn. (1,845,556)

Airplane landing device. Fred G. Runge, New York, N. Y. (1,845,561)

Airplane. Clarence B. McKnight, Los Angeles, Calif. (1,845,616)

Airplane construction. Vincent J. Burnelli, New York, N. Y., assignor to Uppercu-Burnelli Corp. (1,845,648)

Airplane wheel. Isaac M. Laddon, Dayton, and Sidney P. Lyon, Tippecanoe City, Ohio, assignors to Bendix Brake Co., South Bend, Ind. (1,845,802)

Flying device. Walter Goodman, San Fernando, Calif. (1,845,913)

Aircraft. Carl G. Thompson, St. Louis, Mo. (1,845,943)

Dual control for airplanes. William W. Barry, Portland, Ore. (1,845,953)

Aircraft braking device. George J. Daniel, Brooklyn, N. Y. (1,845,960)

Aircraft. Lewis F. Clawson, Jr., La Mesa, Calif. (1,846,088)

Airplane with vertically oscillatable wings. Heinrich Kern, Telnitz, Czechoslovakia. (1,846,115)

Aircraft elevating and propelling mechanism. Alphonse F. La Fon, New York, N. Y. (1,846,125)

Airplane wing. Harry D. Rocheville, Los Angeles, Calif., assignor to Rocheville, Ltd. (1,846,146)

Catapult for gliders. Virgil A. Stevens, South Jacksonville, Fla. (1,846,157)

Airplane. George C. St. Louis, Fresno, Calif. (1,846,159)

Airplane propeller. James T. Lightfoot, Merced, Calif. (1,846,216)

Propeller. Clinton H. Havill, Orange, N. J., assignor to Eclipse Aviation Corp. (1,846,254 and 1,846,256)

Aircraft construction. Judson F. Hampton, Chicago, Ill. (1,846,328)

Ship and airplane. Jean B. Icre, New York, N. Y. (1,846,336)

Aeronautical propeller. George B. Jackson, Three Rivers, Mich. (1,846,337)

Aircraft, wing panels, ailerons, wing beams, wing ribs, and details thereof. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,846,367)

Propelling mechanism. Anthony Sammartino, Philadelphia, Pa. (1,846,404)

Airplane propeller. James A. Benson, Mineral Point, Wis. (1,846,468)

Variable-pitch propeller. Newel C. Jackson, Cassville, Mo. (1,846,488)

Rotating wing device for increasing the carrying capacity of airplane wings. Antonio and Gaetano Longo, Milan, Italy. (1,846,562)

Variable-pitch propeller. Fred Kucera and Ralph P. Goodenhaut, Table Rock, Neb. (1,846,600)

Airplane. Randolph F. Hall, Rochester, N. Y. (1,846,965)

Four-winged airplane. Virgil C. Decker, Harlingen, Tex. (1,846,992)

Airplane control. Earle P. Halliburton, Duncan, Okla. (1,847,088)

Engine-cooling device. James V. Martin, Garden City, N. Y. (1,847,093)

Airplane wing structure. James V. Martin. (1,847,094)

Airplane propeller. Ellis Levay, Detroit, Mich. (1,847,120)

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**GREAT LAKES**  
Sport  
Trainer  
FOR 1932



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THE DETROIT  
SHOW



## PILGRIM TRANSPORT

Richard H. Depew, Jr.

*Sales Engineer, American Airplane & Engine Corp.*

**T**HE Pilgrim Model 100-A transport monoplane, manufactured by the American Airplane and Engine Corporation, carries a pilot and nine passengers. A direct-drive 575-horsepower Pratt & Whitney *Hornet* or Curtiss-Wright *Cyclone* engine is used. Several variations of the model 100 have been built, but the current model, as supplied to American Airways, Inc., has a washroom, mail compartment, and baggage space in addition to the nine passenger seats. Western Electric two-way radio telephone is provided for communication with ground stations, and a receiver, for radio beacon and weather signals.

Either folding or non-folding wings are furnished. On the folding wing model the section of wing between the rear spar and trailing edge folds upward and the gas lines in that region are of flexible tubing; the extra weight of this installation is only 30 pounds. Wing panels are of all-metal structure with cloth covering. Spars are of welded chrome molybdenum steel tubing, heat-treated in one piece. Each spar is approximately 23 feet long and 10 inches

deep. Heat treatment is applied in a vertical electric furnace, and a tensile strength of 160,000 pounds per square inch is developed. Wing tips are bolted on separately and add approximately four feet to the spread of each wing panel. Spar tip units are bolted to the heat-treated sections.

Wing struts are of duralumin tubing, formed to streamline shape by squeezing in a long press. The struts are carried to a point of attachment on the fuselage directly under the rear spar to permit folding the wings.

The landing gear has a tread of 12.5 feet. Axle and drag struts hinge at the side of the fuselage, and the upper end of the shock absorber strut is supported by a tripod of streamline tubing built out from the main structure. The shock absorber strut consists of a steel spring for taxiing and a conventional oleo system for the main shocks. Either 35 by 15 Goodyear Air Wheels or Bendix disc wheels, using high pressure 36 by 8 tires, are furnished as optional equipment.

The 12 by 5 pneumatic tail wheel is permitted free caster action through 360 degrees and is designed to track proper-

ly without vibration or oscillation by the angle at which its swivel axis is tilted. The wheel is carried in a fork, supported by a hinged frame to which the shock absorber strut is attached. This strut is a miniature of the main landing gear strut, containing the same elements of oil and steel spring.

Tail surfaces are of duralumin construction, covered with fabric. The stabilizer has an adjustment through the unusually large angle of 11 degrees and is operated by a torque tube control and crank in the cockpit. Elevators are controlled through a push-rod system to a stick control. The fin is adjustable on the ground only. Tail controls are balanced with the conventional overhung type of surface.

Chrome molybdenum steel tubing is used throughout the fuselage structure. All main fittings are made from machined forgings, bolted in place and so designed that the arrangement of the fittings compensates for inaccuracies of the welded structure. At the forward end of the passenger cabin the main structure is reduced in height to pass beneath the pilot's seat, in this way affording the pilot a view unobstructed by wings or structure.

The engine mount is fastened at the fire-wall by means of four large bolts. Provision of rubber cones at this point prevents metallic contact of the mount and fuselage and reduces engine vibration. The engine being similarly mounted, double insulation is attained.

The mail compartment is located just back of the fire-wall and below the pilot's seat, terminating at the front of the wing. In the passenger cabin, six passengers face forward in individual seats and three face to the rear on a wide, built-in seat at the front of the cabin. Aft of the passenger cabin is a completely equipped washroom. Baggage is carried in the space between the outer cowling and the passenger cabin floor, a space unusually well adapted to its purpose and reached through three independent doors on the outside.

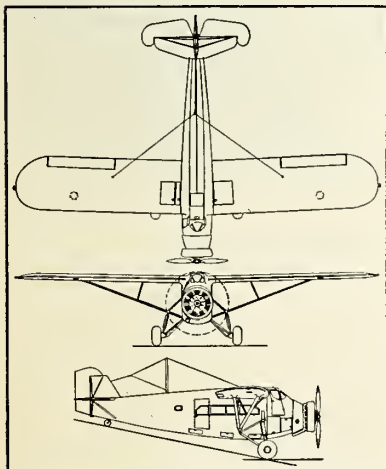
Gasoline is carried in three wing tanks, one of which is a reserve. Nor-



Latest type Pilgrim Model 100-A transport monoplane of American Airways equipped with Goodyear Air Wheels

mally the fuel capacity is 120 gallons, although some installations of 150 gallons have been made, and there is provision for carrying 200 gallons. The oil tank forms part of the cowling at the right side of the ship, just forward of the mail compartment door and outside of the fuselage structure. Similar space on the opposite side of the ship is occupied by the electric compartment, which carries battery, dynamotors, and incidental equipment. The radio transmitter, placed just aft of the washroom, is operated by remote control characteristic of Western Electric installations. Receiver units are carried under each of the two rear passenger seats and are likewise operated by remote control.

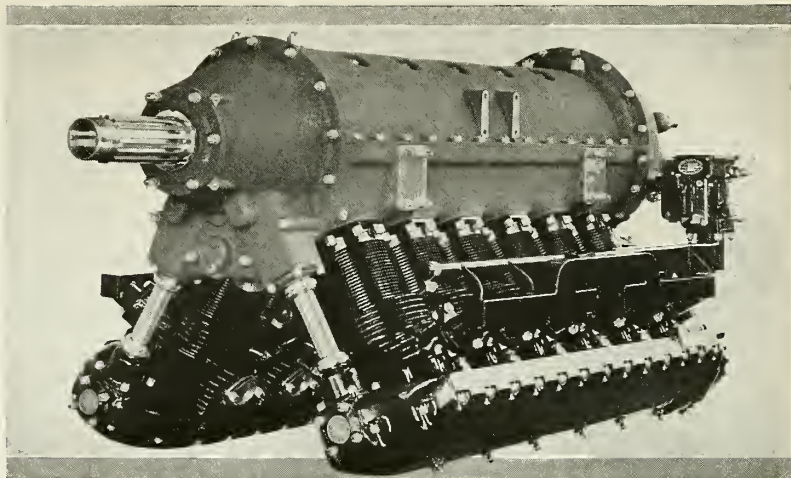
Ordinarily the Pilgrim is fitted for a single pilot and the conventional stick control. Wheel control installations are also available but have not been used because of the light action of the ailerons. The design has been laid out to provide, on special order, sufficient width at the front of the cabin to seat two pilots side by side.



The Pilgrim Model 100-A transport

**Specifications**

Wing span.....	57 feet
Length overall.....	38 feet
Wing chord.....	8 feet 4 inches
Total cargo space.....	357 cubic feet
Weight empty, fully equipped.....	4,630 lbs.
Total non-pay load.....	980 pounds
Total pay load.....	2,140 pounds
Total disposable load.....	3,120 pounds
Gross weight.....	7,750 pounds
Wing loading.....	16.9 lbs. per square foot
Power loading.....	13.5 lbs. per horsepower
High speed .....	136 miles per hour
Cruising speed (1,750 r.p.m.)	118 miles per hour
Landing speed ....	65 miles per hour
Initial rate of climb.....	750 feet per minute
Take-off distance .....	950 feet
Service ceiling .....	13,600 feet
Cruising range.....	3.25 hours, 380 miles



# RANGER V-770 ENGINES

An interesting and promising series of inverted in-line air-cooled engines has been under development by the American Airplane and Engine Corporation at Farmingdale, N. Y., under the direction of Walter F. Davis, chief engineer of the engine division.

The series includes engines of wide power range, all built around the same cylinder design as the model 6-390, a six-cylinder, direct-drive engine which develops 130 h.p. at 2,250 r.p.m. Similarity in cylinder design aids materially in interchangeability of parts, a paramount feature of the whole series which lessens initial costs and reduces service expense. In addition to severe ground testing, the various models have had considerable time in flight, showing fine performance and no major failures.

The 12-cylinder Vee series of Ranger engines includes the V-770, a direct-drive engine which develops 270 h.p. at 2,250 r.p.m.; the V-770-G, a geared engine which develops 300 h.p. at 1,700 propeller r.p.m.; the V-770-S, a direct-drive supercharged engine which develops 325 h.p. at 2,400 r.p.m.; and the V-770-SG, a supercharged and geared engine which develops 340 h.p. at 1,700 propeller r.p.m. This latter model can also be furnished with a rating of 400 h.p. at 1,870 propeller r.p.m.

The weight of the Ranger V-770-SG with a three-to-two reduction gear and a built-in supercharger is 625 pounds; the overall length is 60 inches.

The cylinders employ improved cooling arrangement over previous in-line engines, special head and barrel baffles being incorporated to assure cooling. A substantial increase in cooling fin area has been provided over cylinder heads, both between cylinders and ports, as well as on the barrels.

Herring-bone type propeller reduction

gears are mounted on Hoffman roller bearings and driven through a special connecting shaft by a conventional six-throw, seven-bearing crankshaft. The center line of the propeller shaft is above the crankshaft. A long accessory shaft, driven from the reduction gear, drives the supercharger, pressure oil pump, double scintilla magneto, fuel pump, and two tachometer drives, all located at the rear of the engine. This accessory shaft also serves as an oil feed line to the main bearings, reduction gear, and camshaft.

The propeller hub spline conforms with No. 30 S.A.E. standard; mounting flanges for the accessories such as fuel pumps, starter, generator, magneto and tachometer also conform with S.A.E. standards.

The lubrication system consists of pressure feed to the main bearings, intermittent feed to the connecting rod bearings, spray from crankshaft bearing leakage to cylinders and pistons. All accessory drive shafts have leads connecting to the pressure oil conduit.

A special development is the employment of an inertia dampener at the rear end of the camshaft to place the critical speed of the cam mechanism outside of the engine operating range.

The crankcase is split on the crankshaft center line. Main bearings are plain split type carried in webs in both upper and lower halves of the crankcase.

Pistons are of the trunk type of special heat-treated aluminum alloy with three compression rings and one oil scraper. Piston pins are full floating, retained by lock rings.

Connecting rods are specially forged by the Canton Drop Forge Company from chrome nickel steel and are of the blade and fork type. Connecting rod and main bearings are steel-backed with special lead bronze lining.

# NEW EQUIPMENT AND METHODS

## CHAMPION AERO SPARK PLUG

THE latest addition to the Champion line of spark plugs is the Aero RA. Its radio dome shield is an effective protection against shorting caused by dirt, rain, ice, or oil, and its grounded construction eliminates radio interference, and guards against breakage and trouble caused by foreign objects' coming into contact with the plug. The restricted bore enables it to be used in practically all radial and high-compression, water-cooled motors. This plug is made up of two units—the shield assembly and the base plug assembly, and either can be purchased separately as needed.

## NAVIGATION CALCULATOR

THE EVERETT INSTRUMENT Co. of Fullerton, Calif., is manufacturing a navigation calculator designed to hasten the process of correcting compass errors and of determining the true or compass course quickly and accurately.

The instrument consists of an indicating member in the form of a hand, having a long and a short leg diametrically opposed. The long leg is adapted to traverse a circular scale, formed at the edge of a dial and graduated and numbered in the manner of a compass card in degrees from zero to 360 and also in points and quarter points. The short leg of the hand is adapted to traverse a circular scale near the center of the dial. This scale is graduated and numbered to indicate degrees of east and west deviation in accordance with pre-determined compass errors, resulting from the influence of metallic parts of the craft with which the instrument is used, upon the compass of the plane. This eliminates the necessity for the provision of a separate deviation chart.

Any one of the degree graduations on the dial is adapted to be aligned with an index pointer to indicate various true courses. The index pointer is fixed to the outer side of the frame and is visible with the upper portion of the dial and hand through a glass panel, spanning an opening in the front of the instrument.

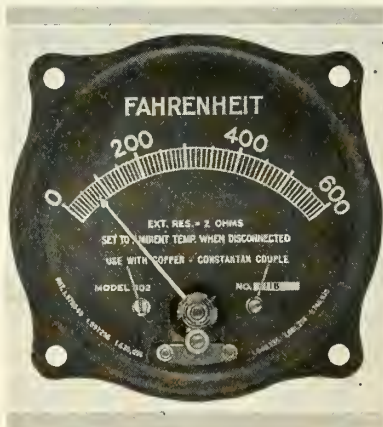
Below the large dial are three small dials—the first graduated and numbered in degrees of east and west variation; the second, in degrees of east and west deviation, and the third, in degrees of east and west drift. A portion of each dial is visible through a magnifying glass panel. By means of knobs, the dials can be rotated for their graduations to co-act with fixed pointers within the openings in indicating pre-determined compass errors. To distinguish east and west vari-

ation, deviation, or drift indications of the dials, the east portion of each dial is indicated by three concentric lines, while the west portion of each is indicated by a zigzag line.

## ENGINE TEMPERATURE INDICATOR

THE Weston Electrical Instrument Corp. of Newark, N. J., has produced the new Model 602 Engine Temperature Indicator, which reduces the measurement of cylinder temperatures to a simple operation. The indicator is automatically compensated for "cold-end" temperature variations, and true temperature is indicated directly on the scale.

Of the moving coil type, the Model 602 Indicator is adjusted for use with copper constantan thermo-couples and leads allowing two ohms for the external circuit resistance. Black dials with luminous figures and a luminous pointer are provided, and the scale is calibrated



Weston engine temperature indicator

zero to 600° Fahrenheit. The indicator is built into a standard 2 $\frac{3}{4}$ -inch aircraft case with four lugs for flush mounting. A shield forms part of the case to protect the compass from magnetic interference, and the cover glasses are of non-shatterable glass. The indicator weighs approximately nineteen ounces:

## TUBE TIMING CONTROL

CLOSE, accurate control of the frequency of current interruption in line welding, and an increase in speed of interruption up to 1800 per minute, are among the features of a new type of Thyatron tube timing control announced by the General Electric Company. The new control replaces mechanical interrupters. The equipment operates in synchronism with the alternating current supply of the welding machine. The weld is always started at a pre-determined

point in the voltage wave and stopped when the current passes through zero.

The synchronous tube timer supplements, and is designed to work in conjunction with, the General Electric welding control type CR 7503, which uses Thyatron tubes instead of contactors for interrupting the flow of current. By a combination of the two equipments, a close degree of accuracy and a high welding speed are obtained. The control has no moving parts and is subject to no such wear as is involved in mechanical interrupters.

## SHEET PACKING AND CUT GASKETS

THE Cooper Manufacturing Company, Marshalltown, Iowa, announces an addition to its line of "Gaskoid," a sheet packing developed from hemp and jute paper impregnated so as to give great tensile strength, making it immune to the action of oil, gasoline, paint, water, etc. It is supplied in rolls of 25 or 50 yards or in sheets 18 by 36 inches, as desired. The company offers Gaskoid in fabricated gaskets of all kinds, in addition to the standard rolls and sheets. It has issued an interesting folder on the manufacture and uses of this product.

## VACUUM CONTACT SWITCH

A NOVEL type of switch, featuring sealed-in-vacuum contacts, has been introduced by the Burgess Battery Company, 202 East 44th St., New York City. This switch is based on the use of the Burgess vacuum contact actuated by the usual toggle switch movement. The vacuum contact is mounted in a holder held by brackets on the rear face of the switch plate. Throwing the handle to the closed position serves to actuate the external glass stem of the vacuum contact, either making or breaking the circuit. The switch is rated at eight amperes intermittently, or six amperes continuously, and 220 volts.

## PROTECTION AGAINST RUST

THE Skybryte Co. of Cleveland, Ohio, has announced Rust-Tox, a liquid protection of metal against rust and corrosion. Used either clear or pigmented, Rust-Tox resists acid fumes, smoke, salt air, and oxygen and forms a protective covering. If rust has already appeared on the surface before the application of Rust-Tox, the liquid is said to neutralize the rust, absorbing all its moisture content and making it chemically inert.

Rust-Tox resists heat up to 550 degrees F. It may be sprayed or brushed at any temperature above 35 degrees, and at high heat it "bakes on" under rivet heads and plate joints, leaving them air-tight and

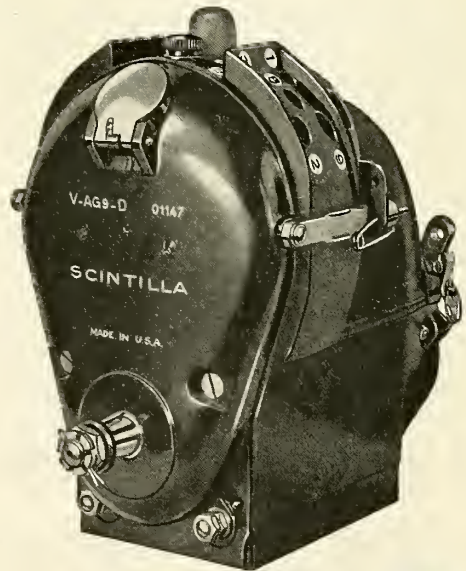
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The nation's air routes are "Scintilla equipped," every mile. Day in, day out, passengers and mail are transported by planes equipped with Scintilla Aircraft Magnets.



SCINTILLA MAGNETO CO., INC.  
SIDNEY, N. Y.

Contractors to the U. S. Army and Navy  
(Subsidiary of Bendix Aviation Corporation)



**DEPENDABILITY      SIMPLICITY      ACCESSIBILITY**

(Continued from preceding page)

water-tight. It also may serve as a vehicle for aluminum flakes, red lead, and graphite. Rust-Tox normally covers about 1,500 square feet per gallon.

#### PENDANT PUSH BUTTON

THE General Electric Company has announced a new pendant type push button for controlling small floor operated cranes. This G. E. button is designed to supersede the present rope and chain types of control and to provide greater safety to the operator and a saving in time, only one man being required to operate the crane.

#### EX-CELL-O DRILLING MACHINE

A SEMI-AUTOMATIC machine for drilling, reaming, counterboring, and tapping all holes in a steering gear case at one locating has been developed by the Ex-Cell-O Aircraft & Tool Corporation. The holes vary in size and location. The operator may load and unload the parts while the machine is in operation without starting or stopping any of the units.

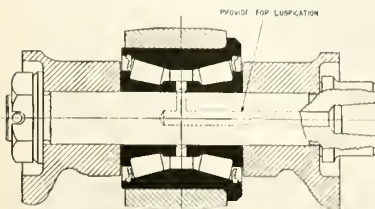
#### ROCKER ARM BEARING

A ROCKER arm bearing designed to give longer bearing life and more dependable rocker arm performance has recently been announced by the Timken Roller Bearing Company of Canton, Ohio. This bearing has been used for some time in military planes and has already been adopted as standard by one prominent aircraft engine manufacturer.

One of the principal advantages obtained from this bearing is its long life, due to the line contact of the rolls, which minimizes the tendency to "brinnell." In addition, the bearing is designed for positive lubrication, a high level of lubricant being maintained in the load zone under all conditions.

The bearing is completely self-contained, with the rolls and races assembled to form a contact unit. It is easy to install and can be removed for inspection or replaced when necessary in a brief time.

The bearing is able to carry thrust as well as radial loads, which overcomes the tendency of the push-rod action to produce lateral wear and looseness. Thus, accurate rocker arm operation is maintained throughout the life of the bearing.



Sectional view of Timken bearing

#### HI-TENSILE ELECTRODES

THE PAGE Steel and Wire Company of Monessen, Pa., has developed a new type of coated electrode, which gives quiet operation with little or no spatter. Inasmuch as the arc is free burning, the molten pool of metal can be readily observed and the amount of metal deposited accurately judged. There is little or no loss of metal due to spatter, which means more economical operation.

The grain structure of the weld is essentially the same as that of mild steel and boiler plate base metal, but the deposit from Page Hi-Tensile electrodes shows a finer grain. The electrode results in deep penetration and sound welds. The strength of the finished weld is equal to that of the base metal with a total elongation of over 30 per cent when pulled to destruction. The finished weld is ductile and also responds readily to heat treatment.

Page Hi-Tensile electrodes do not require reverse polarity for efficient operation. With straight polarity, the speed is equal to that of any other type of electrode using reverse polarity. If reverse polarity is used, even faster speeds may be obtained. The electrode can be bent to a reasonable degree without the coating's peeling or falling off. The coating is moisture proof and requires no baking before using.

#### RUBBER COVERING FOR WINGS

RUBBER covering for airplane wings, designed to prevent abrasion of leading edges during fast flight in rain and sleet, has been tested successfully by Major James H. Doolittle, aviation director for the Shell Petroleum Corp. The rubber was manufactured and applied by The B. F. Goodrich Rubber Company in Akron, Ohio, recently to the Shell Lockheed. The tailored strips are similar in texture to that of the Goodrich de-icers, but have no ice-removing expansion tubes.

Installation of de-icer equipment on a Northrup cabin plane of Transcontinental Western Air Lines was made at Newark Airport recently by engineers of The B. F. Goodrich Company and Eclipse Aviation Corp. The plane will be used on the eastern division of the trans-continental service.

Streamlined rubber tubes applied to the leading edges of the plane are inflated by compressed air, breaking off ice as rapidly as it forms.

#### A SUPERSENSITIVE ALTIMETER

AN ALTIMETER which indicates altitude in units of 10 feet or even less is now being tested. The new instrument, known as the Kollsman altimeter, works on the air pressure principle, but instead of the single metal bellows found in the ordinary altimeter, it has a series of three bellows. Two needles, one to in-

dicating units of 10 feet, and the other, units of 1,000 feet, are used instead of the customary single needle.

So sensitive is the altimeter that it might conceivably be used in blind landings on territory where the altitude above sea level is known, as it has practically no operating lag. The altimeter is easy to read, since the indicator makes a rotation of the entire dial in indicating 1,000 feet.

The instrument has been installed on planes of Transcontinental & Western Air, and pilots have reported its use makes for more efficient and reliable operation under conditions of blind flying. After thorough tests are completed, it is expected that the new altimeter will be used as standard equipment.

#### BATTERY ELIMINATOR

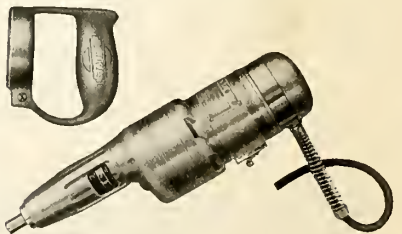
THE AUT-O-BEE, a battery-eliminating device suitable for use on airplanes equipped with radio, has been produced by Motor Car Devices of Los Angeles, California. The device eliminates the B and C batteries and operates over a considerable period of time without attention. The draw on the storage battery averages only one ampere, about the same current as is used for a single headlamp.

The Aut-O-Bee is compact and of light weight, being not over five pounds. Its dimensions are 4 by 5 by 5¼ inches. The lack of rotating parts to wear out eliminates replacement problems. The Aut-O-Bee may be bolted on almost any convenient spot within a few minutes.

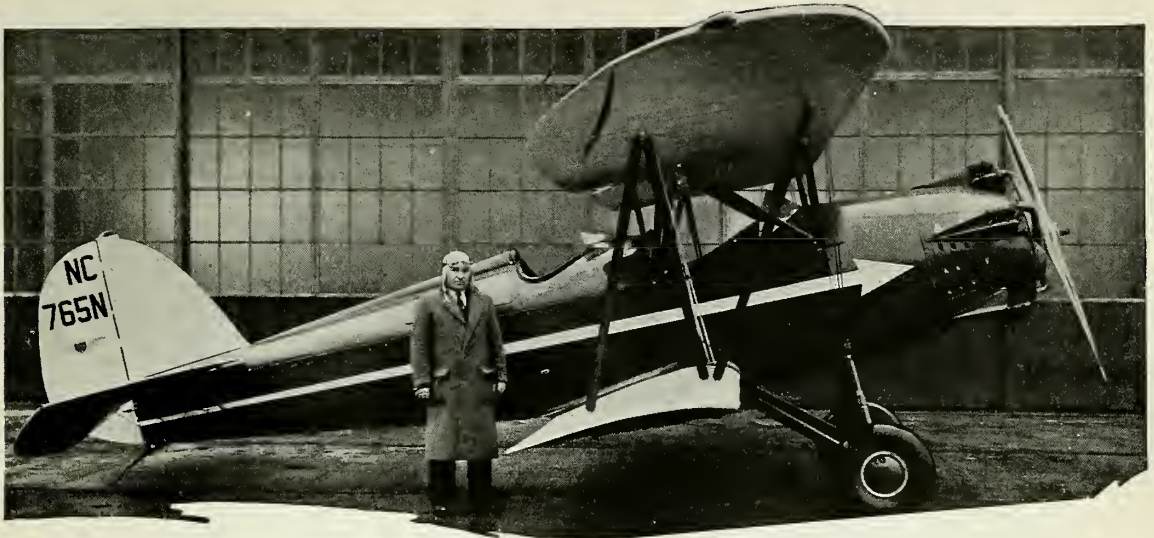
#### ELECTRIC SCREW DRIVER

THE STANLEY ELECTRIC TOOL Co. of New Britain, Conn., has recently produced a screw driver weighing only 4¼ pounds. It will drive up to No. 8 screws in hard wood and No. 10 screws, 1½ inches long, in soft wood. With socket wrenches it may be used on nuts up to quarter-inch machine screw size.

The outstanding feature of the screw driver is the clutch mechanism, designed so that it releases at the exact pressure for which it has been set; this prevents screws from going too deeply into the wood, averts marring the surface of the work, eliminates damaging of screw slots, sets screws tightly, and avoids the hazard of overloading the motor or stripping bolt and screw threads.



The Stanley electric screw driver



Wiley Post and his 4-place 125 hp. Kinner-Bird.  
Post is the Bird distributor for Oklahoma and Texas.

# MORE PILOTS - - DEMAND BIRD SAFETY

**I**NTRODUCED to the air fraternity in 1928 with the highest rating among conventional entries in the Guggenheim Safe Plane Competition—in production now only three years—the Bird biplane in 1931 won second place in total sales in the 3-place open cockpit class and actually led all manufacturers of planes in that group in the fourth quarter of 1931.

Now recognized as the preeminently safe airplane for training—with a performance and economy record which has made it the choice of many of the country's leading amateur and professional pilots, the Bird in 1931 registered—in the face of a major business depression—a steady gain in popularity and a 10% increase in sales. Truly a significant record when measured by a 29% drop in sales for the industry as a whole.

And now Bird leadership in 1932 has been further emphasized by more than 50 improvements in construction details and equipment.

Performance, recognized safety and economy

make the new Bird the outstanding value of 1932 for the professional or amateur pilot.

In addition to our present authorized dealers and representatives CURTISS-WRIGHT FLYING SERVICE, INC., has selected the Bird plane as being best in its class and has been authorized to represent us on Sales and Service throughout the United States through their thirty branches and 385 dealers.

To responsible Dealers and Distributors: The 1932 Bird line makes the Bird sales franchise the most attractive available today in its class and price range. Contact our representative at the Detroit Show or write the factory for full information.

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Over fifty recent improvements make the Bird line the most advanced among open-cockpit airplanes.

Bird planes invite comparison in performance with any others in their power range—including planes equipped with rotor vanes, slots, flaps or variable camber wings.

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BIRD AIRCRAFT CORPORATION, Glendale, L. I., New York



THE SAFE AIRPLANE



# PERSONALITIES

**T**HE extremely serious expression on the face of Gene Hunter may be due to a naturally sad disposition or to the fact that he has received four cracked ribs in a parachute drop. He was nearly electrocuted last spring when his parachute caught in 11,000-volt high tension wires thirty feet from the ground, after barely missing a line carrying 60,000 volts. Twisting himself and pulling at the shroud lines to miss the wires, he fell sideways, fracturing the said ribs, but otherwise not hurting himself. There was a flash of green



Gene Hunter

flame as the shroud lines scraped the high tension wires, and then Gene dropped the thirty feet to the ground, where the ribs caved in. A year before this he had broken both ankles at Santa Barbara.

In all, Gene Hunter has made over a hundred jumps for films and exhibitions.

On one occasion he dropped 5,800 feet before pulling the ring. There's control for you! His name in the films is Dick Terry—perhaps you've seen him. To show you the sort of lad Gene is, I'll quote from a clipping he sends me:

"Hunter had gone up with Nicky Nickerson for an exhibition jump from 300 feet, and was attempting to make a spot landing in front of parked automobiles at the side of the field in order to give the spectators an extra thrill. He had risked his life in jumping so near the high tension wires for the sake of his audience."

If that account is true—and he sends it to me himself without comment—Gene should receive a medal for devotion to an audience. Imagine jumping so near high tension lines in order to give an audience a thrill! He gave that audience its money's worth, anyhow. And from 300 feet! Well, if that's his idea of a good time, I suppose it's all right. They're his ribs, after all, not mine.



apparently they've built all they need for the time being, for he tells me he's still jumping and waiting for the Army to snap him up. Now it seems to me that here is valuable material out of which to make a pursuit pilot. If the Chinese ever hear of him, they'd better put him in their air force, and they'll be certain of one pilot who will do battle with the Japanese. He'll probably be the only one. I have yet to hear of any Japanese airplanes being brought down by Chinamen.



**A**LARMS and excursions without, as Mr. Shakespeare used to say. Enter Captain Samuel Metzger, ranch owner, all dressed up for the next war and awaiting it very comfortably in the Air Corps Reserve. He spent eighteen months defending his country in the last great skirmish, and such was the fame attending his prowess that not an enemy airplane dared cross the Atlantic to do battle with him. It would indeed have gone hard with any German pursuit pilot rash enough to attack California in 1918. Captain Metzger was



Samuel Metzger

right on the job, protecting Mission San Jose and a flock of cows. He was born in Alameda, California, Sept. 19, 1895, struggled through grade schools in San Francisco, was in and out of Cogswell Polytechnic College several times, and spent two years looking at University of California, upon which he was pronounced completely equipped for the battle of life. He has the unadulterated nerve to inform me that as a boy he used to watch the seagulls, and therefore got the idea of

wanting to fly. Anyone who pulls that old bromide on me again is going to be sued for assault and battery. And that other ancient wheeze about "I used to fly kites when I was a boy" is out, too. If every boy who flew kites or watched seagulls had become a pilot, the employment situation would have been even worse than it is now. The simple reason all of us old timers went in for flying is that as youngsters we naturally craved adventure, and flying looked like the answer. All that stuff about "pioneers in the new science" we added long afterwards as an excuse for not completely growing up. And we're still able to fool a few folks here and there.

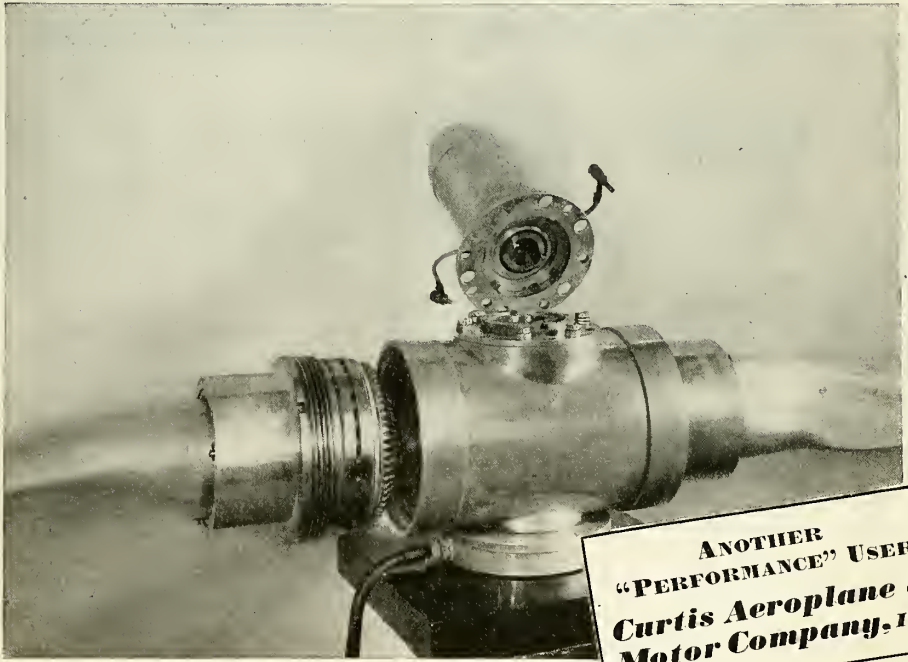
The youthful and still growing Samuel saved up money he had pried out of his family by various subterfuges, such as promoting funds to go to a swell resort for a vacation, but actually banking the money and living there by acting as nurse-maid to a bunch of saddle horses. Finally he had enough to make the down payment on a grass-cutter flying course with Christofferson at Ingleside Beach in San Francisco. Now, there's my idea of flight instruction—the French Method. It's about the only method I'd ever use to teach anyone.

Briefly, the system is as follows: The instructor seats himself, or even lies flat on the grass, lights his pipe or a cigarette, goes into a doze, and in that condition imparts verbally to the pupil anything he may have discovered about flying. If the instructor falls entirely asleep, it doesn't matter, as his time is all paid for anyhow, and the chances are ten to one that the pupil isn't learning anything, even if he's listening, which usually he isn't. After an hour or so of this intensive training, the pupil seats himself in the grass-cutter—any sort of an old airplane with the throttle fastened back so the plane won't get up enough speed to leave the ground. In this vehicle the student careens about the field, trying to hold it level and straight, until a horn is blown or a bell rung violently to inform him that it is time to come in and be bawled out by the instructor.

This alternate grass-cutting and bawling out goes on, sometimes for weeks, until the pupil can keep the plane level and straight, after which the throttle is moved up a notch and the pupil, between bawlings out, is allowed to hop off a few feet, fly a hundred yards, land, fly an-

(Continued on following page)

# DEMANDED... FOR SKF'S HAVE KNOWN DEPENDABILITY



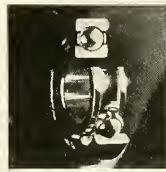
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# SKF

**Ball and Roller Bearings**

(Continued from preceding page)

other hundred, come in to be bawled out, try it again for the length of the field, turn around, be bawled out thoroughly, go at it again, and so on until he is able to do turns, figure eights, and eventually crashes.

Samuel first busted loose from Mother Earth on Feb. 19, 1914, learning by this French Method, which I repeat is the only one I would care to instruct under. He learned in a Curtiss Pusher, powered—if the word power may be used in this case—with a Hall-Scott V-65; also in a single surface pusher with a four-cylinder Curtiss Motor of forty horsepower. About half of these forty horses would gallop off to the ranges every now and then, leaving the Curtiss flat in the pasture.

Metzger first flew the Curtiss yoke control, then Dep, Nieuport, Three-in-one, and Blériot. In those days your flying experience wasn't reckoned by the number of hours you had flown, but by the number of different controls you had used and survived, even if you were still limping. I was the partial master of three controls, a year later than Samuel—the Curtiss shoulder yoke, the Wright, with the rudder in one hand, elevator in another, and feet thrust out as though for a chiroprapist's inspection, and the Dep. The flights were for ten, fifteen, or twenty minutes' duration, or fractions thereof, and there were far more tens than twenties. Success consisted of keeping out of hospitals.

Samuel has owned a Curtiss pusher, two Jennies, a Swallow, an International, a Stinson Jr., and now owns a Stearman. His flying has all been for sport and transportation in connection with his business. He has his own field on his ranch at Mission San Jose, where more spiritually-inclined aviators have been parked through the course of years than ever were gathered together even at National Air Races. He started a commercial company, Metro Air Service, at Oakland Airport, and was smart enough to sell it to Walter Varney in August, 1929, when he saw the over-production beginning to hit the air industry. Clever people, these Chinese! Then he was Chief of Operations of Air Ferries, Ltd., for the first five months of operations, retired to enjoy the slump from the sidelines. I hear that he is now California representative of the Kellett company. For relaxation he entertains Mike Doolin, who, he declares, was dropped on a bathroom floor in early childhood.

Last year, although I told him I wasn't drinking, Sam insisted on presenting me with a bottle of pre war whisky—pre Chinese-Japanese war. I told him I'd take it home in case of sickness. And I felt sick the first day! If Sam wants to give me another quart, I'll also take that home—in case of dandruff.

**L**ES TOWER, test pilot of the Boeing Company, used to be a cowboy in the Montana Bad Lands before he attended the University of Washington, but one day in his sophomore year he picked up a book on aviation. And right there was the finish of one cowboy. Just who wrote that book I don't know. It may have been Walter Hinton—you know, one perusal of Walter's masterpiece will convince anyone under forty that aviation is the only thing in the world, except correspondence school courses.



Les Tower

Whatever book it was, it sure was powerful, for one ruined cowboy immediately applied to the Boeing factory for a job in the engineering department. I'll let Brother Bob Johnson take up the tale and do my work for me.

Thank you, Robert, I appreciate your help in rounding up this old ranch-hand. Folks, Bob Johnson: "He discovered that the Army Air Corps trained select groups of young men, put in his application, took the physical examination, went back to Montana, and waited until he received telegraphic orders to report for duty at March Field. The Army's primary training course is what is commonly known as tough. You have to be good to get in and you have to be better to stay in. You're up on your toes all the time or you're washed out. But when you get through, you're a pilot.

"Tower came back to Seattle and the University. The Boeing Company liked the way he handled airplanes, so finally they decided to groom him for the position of chief test pilot. He went back to the Army, and at Kelly Field entered and survived a rigid advanced training course. He flew everything from pursuits to bombers. That was important, because the Boeing plant builds everything from single seaters to trimotors. When Tower came back to Seattle again, he was all wings.

"Since that time he has been test flying Boeing-built planes. When a new model comes out of the factory ready to be flown, Tower puts on his flying clothes, straps on his parachute and climbs in the cockpit. He's never 'bailed out' of a plane; he says he thinks he'd be afraid to make a jump. Test flying, in Tower's opinion, is not determining whether or not a new plane will fly, for with modern methods of aircraft design and manufacture, that is a foregone conclusion. When a new plane taxis out for the take-off, it is a safe bet that it will fly.

"The test pilot's job is to find out just how well the plane will perform in the air; how fast it will fly, how rapidly and how high it will climb, how easily it handles, how it acts in dives and spins, how well it lands, and, finally, how its performance may be corrected or improved. Small, speedy pursuit planes, sturdy mail transports, low-wing metal monoplanes, giant trimotored air liners—Tower takes them all as they come. They are all airplanes, and he knows what to do with airplanes.

"When the Russians in the 'Land of the Soviets' landed at Sand Point after their flight from Siberia, they expressed a desire to see a Boeing pursuit in action. Tower flew over Boeing Field in one of the small ships and put on a first-rate aerial circus. He climbed thousands of feet, then brought the pursuit down in a screaming dive until it seemed he would surely hurl himself into the ground. Then he yanked the plane out of the terrific dive and raced back into the sky for more acrobatics. After he had impressed the Soviet pilots sufficiently he flew away. Presently he returned in a Boeing eighteen-passenger trimotor whose bulk contrasted strikingly with the small pursuit. Tower put the big ship through its paces and showed the foreign fliers a trick or so.

"At first they wouldn't believe that Tower had flown both the pursuit and the trimotor. Their interpreter said they entertained a very firm conviction that no aviator could fly such entirely different types of aircraft with equal proficiency. When they were finally convinced, they hunted up Tower, and their interpreter told him they thought he was by way of being a pretty fine chap and a damnsky fine pilot.

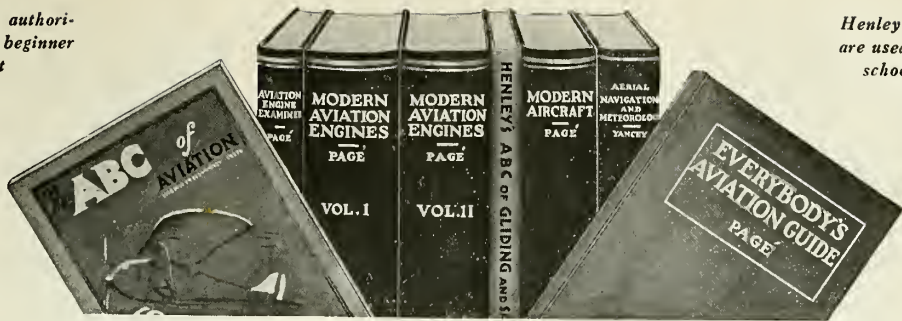
"Tower went across to Japan to demonstrate a Boeing pursuit. They say the Japanese aviators didn't have a great deal to say, but that inches of open space separated their upper and lower jaws during many of Tower's intricate aerial maneuvers.

"Tower isn't generally known as one of the best test pilots in the game, simply because he isn't generally known. He doesn't wear fancy flying clothes and he doesn't try to put himself over in a publicity way. (He'll put most of himself right on top of me after he reads this give-away, if he sees me first.) They say a really fine pilot is one who can get in any kind of a decent airplane and fly it as it should be flown. Tower flies them all—high, wide, and very, very handsome."

Thank you, Mr. Johnson. I do hope this broadcast paves the way for others of Nature's Noblemen to rush to my aid with biographies. It has long been my fondest desire to delegate all my literary labors to enthusiastic helpers in which I merely follow the custom of famous ocean pilots who "write" books.

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# THE AIR SERVICES

## *Dresel New "Akron" Commander*

COMMANDER ALGER H. DRESEL of Lakehurst Naval Air Station has been chosen to command the *Akron*, beginning this month. He will succeed Lieut.-Commander Charles E. Rosendahl, who is in line for promotion to the rank of commander and will be transferred to the *U.S.S. West Virginia* for the sea service necessary before his promotion. In spite of the Naval ruling regarding the term of sea duty, several members of the House Naval Committee are reported to have voted that Lieut.-Commander Rosendahl be retained in command of the *Akron* because of his record in charge of the airship.

Commander Dresel, who was commander of the *Los Angeles* from April, 1931, to February, 1932, was graduated from Annapolis in 1909. He was aide to the commander of the Azores detachment, Atlantic Fleet, during the World War, and he commanded a destroyer in the war zone. Later he was commander of a destroyer and river gunboat in China. Commander Dresel received his airship training at Lakehurst from July, 1929, to June, 1930.

## *Complete Naval Flying Boat*

THE Consolidated Aircraft Co. of Buffalo, N. Y., has completed the XP2Y-I, the first of twenty-five flying boats for Naval use as bombers and patrol planes. It is planned to finish construction of the second in June and of the remaining twenty-three during the summer.

The XP2Y-I is a sesquiplane, with an upper wingspread of 100 feet and a lower wingspread of forty-five feet. The hull is sixty-five feet long.

## *Halligan Commands Air Scouts*

REAR ADMIRAL JOHN HALLIGAN of the Naval War College at Newport, R. I., has been appointed to the command of aircraft of the Naval scouting force. He succeeds Capt. George W. Steele, who has been ordered to take charge of the aircraft carrier, *Saratoga*.

## *Army Tests Plane's Floating Ability*

A TEST regarding the length of time an airplane can float was made recently by the Army Air Corps in Pearl Harbor, Hawaii, with a Boeing Wasp-powered pursuit plane. The plane was catapulted into the water from a high derrick, and an Army pilot performed experiments with newly developed life rafts for planes, demonstrating that the rafts may be launched quickly from a pursuit plane forced down over water. After floating

for twenty minutes, during which the pilot completed the experiments, the plane showed no signs of sinking and was removed from the water. A condemned engine had been installed in the plane, which weighed more than a ton, and all instruments and accessories had been removed.

## *Service Groups to Adopt Insignia*

BLUE and gold have been chosen for the colors of insignia designed for the Seventh Bombardment group, including the Seventieth Service Squadron and the Ninth, Eleventh, and Thirty-first Bombardment squadrons. A feature of the design is the crest, on which is a winged skull and a bony arm and hand holding an upraised aerial bomb. Underneath is a scroll, bearing the Latin phrase, "Mors Ab Alto," "Death From Above." The shield is divided into four sections, representing the four squadrons.

The Air Corps Technical School at Chanute Field, Ill., is represented by a coat-of-arms painted on each side of the planes stationed at the field. The design consists of a crest, a motto, and a blue shield, bearing a gold torch of knowledge on which are three feathers, representing the three original departments of the school. The crest is imposed on a wreath and consists of a mechanic's hand grasping the Key of Knowledge. The motto reads, "Sustineo Alas," "I Sustain the Wings."

## *Martin Bombers Pass Tests*

FOLLOWING successful rigid tests of the first of the diving bombers being constructed on a production order for the Navy by the Glenn L. Martin Company, aircraft manufacturers of Baltimore, Md., the Navy Department gave its final approval and an increase in the original order. The contract, including planes and parts, now totals approximately \$2,500,000. Eight of the bombers are to be delivered as soon as possible. In order to push the work, the force of the Martin plant will be increased by several hundred men in the near future, according to Glenn L. Martin, president. The tests were made by Lieut. William L. Ebel, who is assistant chief engineer of the Martin company.

## *Training Camp at Miami*

THE Navy Department has authorized the establishment of a training camp at the Miami, Fla., Naval Reserve base, according to Lieut. Joseph B. Lynch, commandant. Men will be accepted from all territory east of the Mississippi and south of Norfolk, Virginia.

## *To Build Largest Blimp*

PLANS have been completed for the building of the largest non-rigid airship in the world for the U. S. Army Air Corps, according to Capt. Karl S. Ax-tater, chief of its lighter-than-air unit. The airship will be used for coast patrol work.

The ship, which is to be known as the TC-13, will be built at a cost of \$125,000 and will have an overall length of 233 feet, a diameter of fifty-four feet, and a maximum height, including car, of sixty-nine feet. The TC-13 will have a capacity of 360,000 cubic feet and a gross lift of 22,300 pounds. The envelope will be constructed of specially made cloth. Two Pratt & Whitney Wasp 375-horsepower engines will be used, geared at a ratio of three to two for three-bladed propellers.

No internal construction will be used on the new ship, the pressure of the helium in the main envelope causing the bag to hold its shape. Two balloonets will be placed in the envelope for expansion and trim. Five stabilizing control surfaces, instead of the usual four, will be installed at the rear. The enclosed car will have places for three pilots, two mechanics, a radio operator, a navigator, and a bomber.

## *Gatty Lectures on Avigation*

HAROLD GATTY, senior aerial navigation research engineer of the Air Corps, has been conducting a course in aerial navigation at Bolling Field, D. C., and at the office of the Chief of the Air Corps. The course covers a period of thirty-six classroom hours and embraces all phases of piloting, dead reckoning, celestial navigation, and radio navigation.

## *Hensley Field Improvements*

THE \$69,000 appropriation bill for Hensley Field, introduced into the House as a part of the \$15,000,000 Army housing bill, will be used mainly for the construction of quarters at the Dallas, Tex., airport, Capt. Harry Weddington, executive officer in command, stated recently. Two sets of commissioned officers' quarters will be constructed at an approximate cost of \$25,000, and three groups of non-commissioned officers' quarters, to cost about \$20,000, will be built.

The present sewage disposal plant will be replaced with a new unit costing about \$3,000, and the water system in use will be supplanted by an air-lift pump and storage tank. The balance of the appropriation will be applied to field improvements.

(Continued on following page)

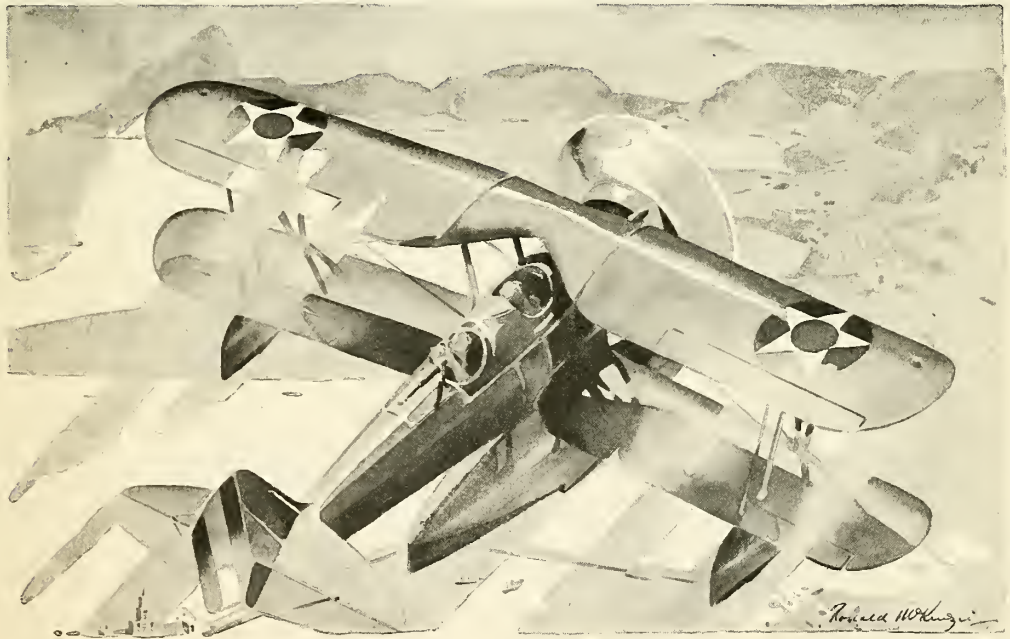




# When the CORSAIR goes Abroad

Long hours of rigorous flying in the far parts of five continents have made the Corsair truly a plane of the world. As seaplanes and landplanes Corsairs have inspired enthusiastic praise in half a dozen languages. Pilots and operating officers find in the Corsair the perfect combination of structural stamina, exceptional performance and reliability that discounts poor landing fields or rough water, and forbidding

mountains or desolate plains below. They have found the Corsair a truly all-purpose airplane—efficient for fighting, observation and bombing—the one plane which meets all their needs. Chance Vought Corporation, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation. Sole Export Representative: United Aircraft Exports, Inc., 230 Park Avenue, New York, U. S. A.



**CHANCE VOUGHT CORPORATION**

(Continued from preceding page)

### **Bolling Tries New Lighting**

BOLLING FIELD is testing a new method of boundary lighting. A small engine of one-sixth horsepower operates the mechanism, allowing the intensity of the lights to vary. All the boundary lights operate from field intensity downward to a low order of intensity. From a distance the lights appear as blinkers. The incoming pilot sees a field defined by blinking lights which instantly attract his attention.

### **Indiana Uses Blind Flight Aid**

TO make possible instrument flying, the 113th Observation Squadron, Indiana National Guard, have on an O-38B ship a sliding cover for the front cockpit, adjustable in flight by the pilot. Construction of this device consists of two 3/8-inch tool-steel rods running lengthwise on each side of the cockpit and clamped at each end to the longerons. This acts as a track on which slides an N-shaped bow made of strap iron, three-sixteenth inch by one inch, which has steel tubing attached to each end, sliding on the steel rods. This end bow has two handles on the inside, in order to move the bow forward to the rear edge of windshield. Another bow is fastened to rods at the rear and made secure to the cowl in front of the rear windshield. A canvas cover is laced around rear and front bows and to rings along the sides, which slide on steel rods.

After taking off, the pilot slides the front bow forward to the rear edge of the front windshield and makes it secure, by flaps which are part of the canvas cover, to lift-a-dot fasteners on the inside of the cowl in front of the windshield. This completely covers the cockpit except for a small opening in the back, which permits any gas fumes which might be in the cockpit to escape and also permits the check pilot to see the pilot at all times.

The blind flying is done at a minimum altitude of 2,000 feet, and there is always an assistant pilot in the rear cockpit to take charge in case of emergency.

### **Pilots Test Skis**

ALL types of skis were found to be successful in a test of recent landing ski developments made by six pilots of the First Pursuit Group, Selfridge Field, Michigan. In spite of their small bearing surface, the wheel skis proved to be entirely adequate for landings and take-offs in all conditions of snow. Their drag on the surface is somewhat greater than flat skis, but their value is felt when any bare ground is encountered.

### **New Plotting Sheet**

THE Hydrographic Office has announced the completion of a new "Universal Plotting Sheet." It has a compass rose in three-inch radius in the center of a sheet 10½ inches by fourteen inches, together with a convenient scale of dis-

tances on which three inches equal one degree of latitude, or one inch equals twenty knots.

In three corners of the plotting sheet are placed forms for recording the wind, carrier, and plane data. In the right lower corner is placed a longitude scale for latitude zero to eighty degrees. There is also space for a flight log at the top of the sheet. At the bottom is placed a scale for converting nautical to statute miles and vice versa.

By means of the Universal Plotting Sheet, a Mercator chart covering 100 square miles may be constructed in a few seconds. In addition, any graphical wind problem may be solved conveniently, or the sheet may be used as a substitute for the more complicated mooring board sheet. The new type aircraft plotter being issued to the Services is constructed to the same scale as the Universal Plotting Sheet, and when used together, they afford a convenient means for solving the usual problems of the aviator which require plotting.

### **Autogiro Wins Against Searchlights**

DURING a recent test made by the 69th Coast Artillery at Ocala, Fla., an autogiro piloted by Don Walker and owned by the Piston Ring Company of Muskegon, Mich., established a new use for its maneuverability.

The coast artillery was staging a demonstration of their searchlight battery, consisting of two 400,000,000-candlepower searchlights for the protection of cities and towns in case of air raid. Pilot Walker, in the autogiro was chosen to try to out-manuever the powerful beams of light which have a penetrating depth of over six miles and are one of the latest anti-aircraft developments.

The autogiro won the contest. As the powerful beams searched it out in the night sky, it would suddenly disappear into a cloud bank and remain there until ready to emerge. The autogiro, having the ability to descend at the rate of fourteen feet per second, two feet more slowly than a parachute, kept the Army sharpshooters in constant uncertainty.

Pilot Walker will continue a series of demonstrations throughout the country.

### **End Haitian Aerial Survey**

MARINE Aviation Squadron 9-M attached to First Brigade, U. S. Marines, Haiti, has completed an aerial survey for the Hydrographic Office of the northern coast of Haiti from Cap Haitien to the Dominican border, for the purpose of making new hydrographic charts of that region.

Second Lieut. Raymond S. Scollin was pilot of the observation plane used in this work, and Gunner Sgt. Dominick Paul was photographer. The area covered extended a distance of 125 miles. During the survey the lighthouse at St. Marc was correctly charted for the first time.

### **Complete Mapping Project**

A FINAL practical test of the experimental model five-lens camera was recently completed. Capt. Albert W. Stevens, photographer, and Lieut. J. F. Phillips, pilot, have returned to the Materiel Division after having been engaged on a mapping project of the Sacramento and San Joaquin river valleys in California. The area covered was 1,000 square miles. This work was on an unusually large scale, and the photographs were obtained from low elevations, with great side and end overlap. Nine thousand negatives were made for the U. S. Coast and Geodetic Survey, which is preparing new large-scale maps of this region.

The camera used was a T-3A, developed by the Materiel Division following the original three-lens camera designed by Major J. W. Bagley. The negative material was a new aerial supersensitive panchromatic film on a special non-shrink base. With this film excellent photographs were obtained in winter weather, early mornings, and late afternoons through ray filters which excluded all blue light. Haze and water vapor reflect much blue, and it is desirable to prevent light of this color from reaching the negative in order to obtain clear photographs.

The airplane used was the F-1A Army monoplane built especially for photographic work, with maximum ceiling of 23,000 feet.

### **Air Force in Another "War"**

AIRPLANES of the Blue and Black fleets played a prominent part in recent Naval war games in the Pacific Ocean off the coast of California. A feature was an aerial combat between groups of planes from the opposing aircraft carriers, *Saratoga* and *Lexington*, which was fought 1,000 miles from land. The *Lexington* was judged by the umpires to have been thirty-eight per cent damaged by bombs from the Blue planes, while Black planes "sank" one destroyer of the Blue fleet, whose aircraft effectiveness was decided to be reduced twenty-five per cent as a result of the attack.

### **Major Hickman at Fort Crockett**

MAJOR HORACE M. HICKMAN, Air Corps, will succeed Major Davenport Johnson as commanding officer at Fort Crockett, Galveston, Tex., on May 3. Major Johnson will leave June 20 for Washington, where he will become attached to the War Department general staff.

### **First Randolph Graduates**

THE first class to graduate from Randolph Field, the new Air Corps training center, numbers 101 students, including two U. S. Army officers, a German army officer, and ninety-eight flying cadets. These Primary Flying School graduates were transferred March 1 to Kelly Field, Tex., for advanced flying training.

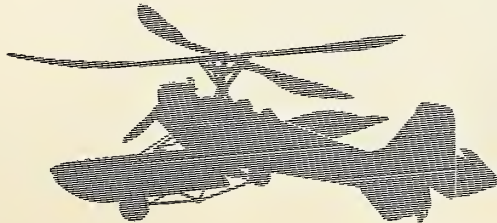


# The Wilford Gyroplane

THE Pennsylvania Aircraft Syndicate, Ltd., announces the issue of a basic patent on the rigid feathering "Gyroplane." The Gyroplane is a rotary wing aircraft which differs in principle and has rotor control, with low cost of production and maintenance.

*Write for information on custom built gyros, or rights to develop designs under the basic R & K patents which fully protect the rigid system.*

**Penna. Aircraft Syndicate**  
 Wilford Building Philadelphia, Pennsylvania



# AERONAUTICAL INDUSTRY

## *United Aircraft Reports Profit*

A NET INCOME of \$2,907,548 for 1931, equivalent after preferred dividends to \$1.04 a share on the average number of shares outstanding during the year, was reported by the United Aircraft and Transport Corp. last month. The company's earned surplus at the end of 1931, after special write-downs totaling \$2,015,544, was stated to be \$6,182,128, as compared with a surplus of \$6,010,124 at the close of 1930.

Operating revenues and sales of aeronautical equipment in 1931 totaled \$27,752,658, according to the report. President F. B. Rentschler pointed out that the equipment companies of the corporation showed unfilled orders on hand on December 31 amounting to \$8,147,737. Additional business in 1932 totaled \$1,530,328 at the time of the report.

Mr. Rentschler pointed out the gain in business on the United Air Lines routes and stated that the transport companies were expecting a continuing rate of increase in passenger traffic. He said that within a year it is planned to begin replacing present equipment with a new type of transport ships with a much greater cruising speed.

In calling attention to the improved liquid position of the company, Mr. Rentschler declared that a considerable part of the reduction of merchandise inventories included a special write-down of certain planes and parts carried over from previous years which were found not to be marketable at inventory prices of a year ago.

Accounts receivable were \$3,249,463 and inventories amounted to \$3,964,016, according to the report. With cash, U. S. Treasury and Liberty bonds, and other readily marketable securities in the amount of \$17,791,526, the current assets totaled \$25,005,006. Current liabilities were \$1,642,516.

## *North American Cuts Directorate*

A REDUCTION of the directorate of North American Aviation, Inc., from forty-five to twenty-four members has been announced. Harold E. Talbott, Jr., has been elected chairman of the executive committee and chief executive officer of the company.

An application of the corporation for listing 2,118,959 shares of new five-dollar par value stock to be exchanged, share for share, for the current no par stock, was approved by the New York Stock Exchange March 10. The capital surplus was reported to be increased by \$15,892,192 through the reduction in capital rep-

resented by the common shares from \$12.50 to \$5.00 a share. Reductions in the company's investments' value to market prices on December 31 and other special charges were declared to total \$13,425,777.

## *Propose Unified Radio Control*

UNITED AIR LINES has announced a plan to coordinate all independently operated radio systems controlling air traffic in the United States. The system, which is reported to be already about ninety per cent complete, linking airway radio transmitting stations in ninety cities, will be directed by Aeronautical Radio, a public utility subsidiary of the air mail operators, according to the plan.

Frequent weather reports, communications to operating personnel in flight, and private messages to passengers, under certain conditions, will be supplied by the two-way radio-telephone system. All planes flying on a regularly operated line will participate in the new method of unified voice control, it is planned, resulting in the elimination of conflicting radio communication systems on an airway used by several companies and in a conservation of wave lengths.

## *L. T. Cohu Heads Aviation Corp.*

LAMOTTE T. COHU, president of Air Investors, Inc., was elected head of the Aviation Corporation March 17. Mr. Cohu succeeds Frederic G. Coburn, who resigned as president and director. Mr. Cohu is a partner in the brokerage firm of Myron S. Hall & Co. and is a director in Air Investors, Inc.; Air Associates, Inc., and Roosevelt Field, Inc.

D. J. Walsh, Jr., resigned as director at the same time as Mr. Coburn. Both are members of the firm of Sanderson & Porter, who have been supervising the business of the subsidiaries of the Aviation Corporation for about two years. The latter company will retain Sanderson & Porter as consultants.

## *Kellett Corp. to Finance*

ALONG with plans for increased production in the United States, the Kellett Autogiro Corp. is planning public financing, it was announced recently. Class A common stock in the amount of 200,000 shares will constitute the part of the capitalization to be sold to the public. One hundred thousand shares of Class B common stock will comprise the remainder of the capitalization.

## COMING AERONAUTICAL EVENTS

April 1-May 1. Aeronautical Exhibition at Athens, Greece.

April 2-10. National Aircraft Show of 1932 at Detroit City Airport, Detroit, Michigan.

May 7-28. International Olympic Air Cruise, beginning and ending at Los Angeles, California, planned to visit thirty-three cities in the United States, Mexico, and Canada in the interests of the Tenth Olympiad; under the auspices of the Los Angeles Junior Chamber of Commerce.

May 16-22. Northwest Aircraft Show, St. Paul, Minnesota.

May 22-30. International Reunion of Trans-oceanic Fliers, under the auspices of the Royal Aero Club of Italy, at Rome.

May 27-30. Omaha, Nebraska, Air Races, including National Balloon Race, under the auspices of the Omaha Junior Chamber of Commerce.

June 6-8. Sixth Aeronautic Meeting, Aeronautic Division, American Society of Mechanical Engineers, at Buffalo, New York.

June 9-10. Pacific Coast Aeronautic Meeting, American Society of Mechanical Engineers, at the University of California, Berkeley, California.

June 20-24. Annual Meeting of American Society for Testing Materials, Atlantic City, New Jersey.

July 18-31. National Gliding and Soaring Contests under the auspices of the American Soaring Association, Inc., at Elmira, New York.

August-September. National Air Races at Cleveland, Ohio.

September 6. Aviation Day, marking opening of Travel Pageant, Atlantic City, New Jersey.

September 25 or October 2. Gordon Bennett Trophy Balloon Races at Basel, Switzerland.

October. Texas State Fair, including aeronautical exhibits and events.

November 25-December 11. Thirteenth International Aeronautical Exhibition, under the auspices of the Syndical Chamber of Aeronautical Industries, in the Grand Palais, Paris, France.

### Air Races at Omaha

THE National Balloon Race will be held at Omaha, Neb., as a feature of the annual Junior Chamber of Commerce airplane races there May 27-30. The victors in the balloon distance flight will represent the United States in the Gordon Bennett trophy races at Basel, Switzerland, in September. From eight to twelve balloons are expected to participate at Omaha, of which the Army is sending three, the Goodyear company, two, and the Navy, one.

Ten thousand dollars in prize money will go to the winners of the heavier-than-air contests. All of the airplane races will be flown on a triangular five-mile course around the Omaha airport. Among the racing events and aerial competitions planned by Manager Phil Henderson are speed dashes for both open and cabin planes of every power class and displacement, dead-stick landing, bomb-dropping, balloon-bursting, mail-sack races, acrobatic exhibitions, parachute jumps, army maneuvers, night flying exhibitions, and a sportsmen pilots' competition.

Mr. Henderson is receiving entries at the Junior Chamber of Commerce, Woodmen of the World Building, Omaha.

### Kinner Company Report

PROSPECTS for business are reported as very encouraging in a letter from the president of the Kinner Airplane & Motor Corp., Ltd., to the stockholders. The letter points out that the Waco Aircraft Company is offering five models equipped with Kinner engines, and the Bird Aircraft Company is bringing out two new models in addition to the three models now on the market, all of which will be equipped with Kinner engines. Both the Kellett Autogiro Corp. and Pittcairn Aircraft, Inc., manufacturers of autogiros, are offering models this year equipped with Kinner engines, and the U. S. Army has just placed an order for additional 210-horsepower Kinner engines for use in Army training planes.

In his letter the president states that Kinner engines powered sixty-four per cent of all the planes in the Kinner horsepower class licensed for the first time during 1931. This compares with fifty per cent in 1930 and thirty-four per cent in 1929. Practically all of the sales during 1931 were on the 100-horsepower and 125-horsepower engines. Two additional models have been added: One 160-horsepower and one 210-horsepower. The company now has orders on hand for immediate shipment totaling more than \$60,000. The company has under development two additional engines, to be announced later this year.

It has been decided to increase the working capital of the company through the sale of stock to present stockholders. It is expected to bring into the treasury

by this means \$99,967, which will pay off all the indebtedness of the company and give it considerable additional working capital. Current liabilities were reduced from \$140,779 to \$68,703 during 1931, and the ratio of current assets to current liabilities as of December 31, 1931, is approximately three to one, the current assets being \$200,305, and the current liabilities, \$68,703.

### Scintilla to Exhibit Delco

IN addition to its line of aircraft magnetos, the Scintilla Magneto Company, Inc., of Sidney, N. Y., will exhibit the newly announced line of Delco Aviation Ignition at the Detroit Aircraft Show. This aircraft battery ignition equipment represents the closely coordinated engineering efforts of the Bendix Research Corporation, Eclipse Aviation Corporation, Delco Aviation Corporation, and Scintilla Magneto Company, Inc.

### Mather New Kellett Distributor

THE Kellett Autogiro Corporation of Philadelphia has announced the appointment of R. V. H. Mather as distributor for southern California. G. H. Miller, an autogiro flight instructor in Philadelphia and a brother of the company's test pilot, Guy Miller, will be associated with Mr. Mather as pilot salesman. It is planned to start operations on the Pacific Coast about April 1, with headquarters at an airport near Los Angeles.

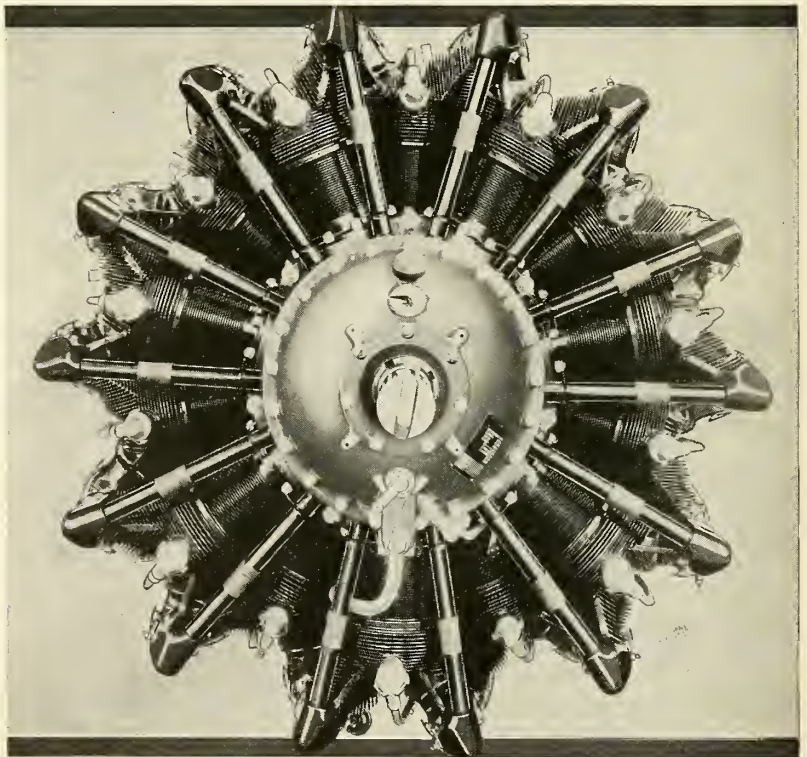
### The Twin Wasp Junior Engine

PREPARATORY to its formal delivery to the U. S. Navy, for which it was designed, details of a new 14-cylinder, 625-horsepower, two-row radial engine were announced recently by The Pratt & Whitney Aircraft Company.

The new engine, powering a new type Vought Corsair Navy observation plane, will be exhibited at the National Aircraft Show, following which the ship will be flown to Washington, D. C.

Consisting of two banks of seven cylinders each, staggered so as to permit the most efficient cooling, the Twin Wasp Junior's most notable characteristic is its high power development with a very low frontal area. The overall diameter of the engine is 43 $\frac{3}{8}$  inches, which is considerably smaller than that of any other radial air-cooled engine developing the same power. The overall length of the engine is 48 $\frac{1}{4}$  inches.

Although the Twin Wasp Junior as supplied to the U. S. Navy is a direct-drive engine, propeller reduction gearing is possible if expedient for increased performance in other installations. The induction system and accessory arrangement remain the same as employed on all other Pratt & Whitney engines, and this new model may be supercharged by an increase in the compression and blower gear ratios, thus permitting a higher horsepower output for increased altitude performance.



Pratt & Whitney Twin Wasp Jr. radial air-cooled engine, developing 625 horsepower

(Continued from preceding page)

### To Show Smallest Navy Plane

THE NEWEST and smallest of the Navy's air fighting fleet, the F9C-2, built by the Curtiss Aeroplane and Motor Co., Buffalo, N. Y., will be exhibited at the National Aircraft Show at Detroit through the courtesy of the Naval Bureau of Aeronautics. Several of these little planes, now nearing completion, will use the *Akron* as a hangar.

The F9C was designed to be the smallest airplane which could be built around the Wright Whirlwind 420-horsepower engine, with pilot and required military equipment. Structurally, the most outstanding feature is the metal monocoque fuselage. The skin is formed by dural sheets riveted together and braced internally by dural bulkheads and longitudinal members. The ship is a biplane with wings of the gull type, fairing directly into the fuselage. Spars are of tubular dural construction, ribs are stamped dural, and the wings are covered with fabric. The ailerons are on the upper wing only. Tail surfaces are metal covered and faired into the fuselage. The tail skid is of the full swivel wheel type, and the landing gear is of the single-strut, split-axle type, with spats over the wheels, which are equipped with brakes. The plane is only nineteen feet long, with a wing span of twenty-five feet six inches. It has a top speed of approximately 180 miles per hour and can climb 1,800 feet per minute.

Within the *Akron* a large hangar has been built for the stowage and maintenance of such planes. The gear for hooking on, hoisting, and releasing planes consists of a lattice-work structure extending below the keel of the airship and carrying at its lower end a bar which engages with an overhead hook on the airplane.

### Atlantic City Pageant

AVIATION DAY, featuring an aviation show and aerial races in which Government and private planes will participate, will be the opening feature of the Atlantic City Travel Pageant, to be held at the New Jersey resort during the week following Labor Day. The pageant will be under the auspices of National Travel Pageant, Inc., a non-profit corporation, organized to stimulate travel and the transportation business, particularly in the United States.

Harry Hackney is general chairman of the organization, and among members of the advisory board are Lieut. Walter Hinton of Washington, D. C., and J. P. Muller of New York, both prominent in the National Exchange Club.

The tentative program for the opening day of the pageant includes, in the forenoon, the arrival of "Juno, Queen of the Air," at the Atlantic City Airport. In the afternoon it is planned to hold a "Grand Parade of the Skies," with participation by Army and Navy planes, the *Akron*, and aircraft piloted by foreign aviators from the National Air Races at Cleveland. Arrangements have been made to anchor an airplane carrier among other Government exhibits for public inspection. It is proposed to follow the parade by contests and races, including a relay race in which all types of ships may enter. An aeronautical banquet in the evening, with a coast-to-coast radio hook-up, will close the day's program.

The aeronautical events will be held under the sponsorship of organizations prominent in aviation, such as the Betsy Ross Corps of Women Flyers, the National Exchange Club, and the New Jersey State Aviation Commission.

It is planned to conduct various contests preceding the pageant, including state essay contests on the subject, "What Attractions within the State, including

Historical and Other Points of Interest, Are of Interest to Travelers." The winners will receive an all-expense tour to Atlantic City with accommodations at a leading hotel during the pageant and a round-trip airplane ride from Atlantic City to New York. They also will be eligible to compete in a national essay contest on the topic, "Why More Travelers Visit Atlantic City Than Any Other Resort."

Another essay competition, open only to agents of transportation companies, will have the subject, "Why See America First?" Another prize will be awarded to the winner in each state of a contest for a radio sketch on "The Romance of Transportation—from Washington to Hoover." The successful competitors will be eligible for participation in a national contest.

### Texas Fair to Feature Air Show

AN aviation exhibit and an endurance contest at Love Field are being arranged as important features of the Texas State Fair next October, Col. William E. Eastwood, Jr., chairman of the fair aviation committee, has announced. The progress of the entire aviation industry from the first crude and dangerous attempts to present stable and extensive proportions will be depicted with models and exhibits. An air transport show will include various types of planes and engines with accessories and equipment.

Half of the Automobile Building will be used for plane exhibits. The Government has agreed to supply a number of Army planes with pilots to explain their workings. Italy, Cuba, and France are being requested to send one or more planes for the exhibit.

Contests in a model exhibition of planes began March 1, with regional winners to enter the state competitions for prizes.

### A. S. M. E. Aeronautical Meetings

ABOUT thirty technical papers and reports from two special committees will be included in the program of the sixth national aeronautic meeting of the Aeronautic Division of the American Society of Mechanical Engineers at Buffalo, N. Y., June 6-8. T. P. Wright, vice president of the Curtiss Aeroplane & Motor Co. of Buffalo, is chairman of arrangements.

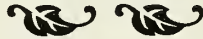
The Pacific Coast aeronautic meeting of the society will be held June 9-10. The first morning session and the second day's program will be at the University of California. Visits will be made to the airport and to Stanford University, and a dinner will be given June 9 at the Engineers' Club, San Francisco. For the meeting papers are scheduled on "Thin Walled Structures," "Turbulence Problems," and "The Effect of Fillets on Wing Fuselage Interference."

(Continued on following page)



Curtiss F9C-2, Navy's newest and smallest airplane, to be carried by the "Akron"

**THE BURNELLI TRANSPORT** is the result of a thorough development program of construction, test flying, and research which has been carried forward since 1920. The design is based on the flying wing type (an airfoil section with cargo space and multi-engines at the entering edge) applicable to military and commercial service. The advancement of air transportation is dependent on a rapid increase in the inherent qualities of design to provide the maximum speed, safety and space with reduced construction and operating costs. An analysis of the Burnelli design relating to aerodynamics, power with structural arrangement, cargo space with mechanical details, clearly indicates that it will meet these essentials in a superior way.



**DESIGN COMPARISON      PRACTICAL ADVANTAGES**

	High Speed Single Engine	Burnelli Twin Engine
Horsepower .....	425	1,200
Gross weight .....	4,700	13,300
Frontal area of fuselage, square feet..	17.5	50
H.P. per square foot of frontal area..	24.2	24
Cargo space, cubic feet.....	135	550
H.P. per cubic foot of cargo space...	3.15	2.12
Drag coefficient of body ideally faired..	.00016	.00022
Engine with cooling system.....	.00030	.00030
Lift coefficient of body.....	0	.0020
Equivalent wing area saving feet....	0	140
Equivalent resistance saving flat plate	0	1.22
Resulting comparative body resistance per 100 H.P. equivalent flat plate...	.305	.290
Percentage of engine power required by body at 190 m.p.h.....	28%	21%
Engine power required at 190 m.p.h. per 100 cubic feet of cargo space..	88	46

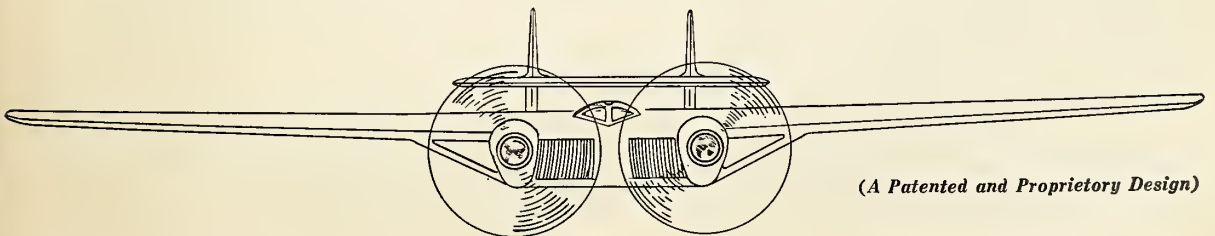
1. Accessible Multiple Engine Compartment, allowing inspection and minor repairs during flight.
2. Extensive Reduction of Head Resistance, necessary to high performance.
3. Reduced Turning Moment on One Engine, assisting flight with one motor operating.
4. Fuselage Lift Reduces Landing Speed, valuable for greater speed range.
5. Increased Capacity of Fuselage, maximum space for comfort and light cargo.
6. Practical Landing Gear Retraction, for increased aerodynamic efficiency.
7. Superior Safety in Operation. Protection afforded by engines and propellers being well forward of pilot's and passenger cabin.
8. Structural Efficiency and Simplicity. Stresses of engines, propellers and landing gear bear no relation to wing truss.
9. Convertible to Seaplane or Amphibion. The wide fuselage permits efficient twin float attachment interchangeable with landing gear.

**AERODYNAMIC BASES**

The aerodynamic advance of this design is due to the following as set forth and extracted from wind tunnel research report of the Guggenheim School of Aeronautics, New York University:

1. The use of airfoil shaped body while providing large internal space contributes substantially to the lift.
2. The body being of airfoil form has a very low drag coefficient.
3. The high wing monoplane gives the most efficient wing and body combination.
4. The design allows for retraction of the landing gear together with a high wing and body combination.
5. The design permits the use of twin engine installation without penalty in additional frontal area.

**UPPERCU-BURNELLI CORPORATION, KEYPORT, NEW JERSEY**



(A Patented and Proprietary Design)

(Continued from preceding page)

#### **Beech Resigns from Curtiss-Wright**

WALTER BEECH, veteran pilot and well-known commercial airplane manufacturer, has announced his resignation as vice president of the Curtiss-Wright Corp. and as president of the Curtiss-Wright Airplane Company. Mr. Beech, who will remain one of the largest stockholders of the Curtiss-Wright Corp., stated that his resignation was tendered so that he might further his ideas in building fast commercial airplanes.

Since 1929, Mr. Beech has been with the Curtiss-Wright Corp., where he was in charge of the construction of over 400 airplanes of six different models. He has spent the major part of his life in the Middle West as a commercial airplane manufacturer and has constructed and built more commercial airplanes than any other individual manufacturer in America. In 1921 he took over the manufacture and development of the Swallow Airplane Company and constructed the New Swallow, an open cockpit biplane which was the first commercial ship in the market with a split-axle landing gear and completely streamlined motor. Two hundred and fifty of these planes were built under his direction.

He organized the Travel Air Manufacturing Company and in 1925 built one of the most outstanding types of open cockpit commercial planes, 922 open cockpit and cabin planes being constructed under his guidance. He constructed the first commercial plane powered with an air-cooled engine.

#### **Sells 11 Planes in 90 Days**

MAJOR LESLIE G. MULZER has reported the following airplane sales during a ninety-day period at Nepco Tri-City Airport, Wisconsin Rapids, Wis.:

Fairchild KR-34 to Carl J. Lindstrom, Dallas, Tex.; Fairchild KR-21 to Guerdon Brocksom, Waukegan, Ill.; Fairchild KR-31 to H. W. Martin, Nekoosa, Wis.; Fairchild KR-31 to Roy Good, Kingsville, Tex.; Fairchild FC-2 monoplane to Girourd Flying Service, Detroit, Mich.; Waco F to Dr. A. C. Lawrence, Crooksville, Ohio; Waco J-6 300 Taper Wing to Northwest Airways, Inc., St. Paul, Minn.; Curtiss Robin to Dr. M. R. Hermann, Duluth, Minn.; American Eagle biplane to Ben. C. Arquett, Farley, Iowa; Waco 225 to Dr. J. S. Hess, Jr., Mauston, Wis.; Monocoupe to George Johnson, Philadelphia, Pa.

#### **Brewster Aeronautical Change**

THE business of the aircraft division of Brewster & Co., Inc., has been acquired by the Brewster Aeronautical Corporation. The latter company will occupy the plant formerly operated by Brewster & Co. and has obtained all engineering data, patents, licenses, and plant equipment formerly owned by it. Plant equipment includes anodizing, heat treat-

ing, plating, electrical spot welding, physical testing, and machine and metal-working facilities. The company will specialize in the design and manufacture of aircraft parts and assemblies, particularly pontoons and flying boat hulls, and will continue the development and manufacture of spot-welded stainless steel aircraft.

#### **Licensed for Pratt & Whitney**

THE Pratt & Whitney Aircraft Co. has announced that it has completed arrangements whereby licenses may be granted under the United States and foreign patents owned by Boulton & Paul, Ltd., for the use of Townend rings with new and used Pratt & Whitney engines. The license fee is contingent upon the model of the engine for which the equipment is intended.

#### **Catapult Service for Passengers**

A SHIP-TO-SHORE seaplane service which will carry passengers as well as mail is reported to be contemplated by the North German Lloyd steamship line. The service, for mail only, has been in use for several years, but passengers have been refused because of lack of room.

Both the *Bremen* and the *Europa* will be used for the catapult service this summer, it is said. The *Bremen* plane will be a Heinkel low-wing monoplane, equipped with pontoons, to be flown by Pilot Gruetering of the German Luft Hansa. The *Europa* will have a low-wing Junkers W-34, capable of carrying a large load of mail and passengers and with a cruising speed of 125 miles per hour and a cruising radius of 800 miles. It will be flown by Pilot Blankenburg of the Lloyd and Luft Hansa lines.

It is planned that in good weather the planes will fly with both mail and passengers directly to Boston from 800 miles at sea. If the weather is unfavorable, a stop will be made at Halifax, Nova Scotia. Air connections may be made at Boston. With the ship-to-shore service, it may be possible for a passenger to make a three-day trans-Atlantic crossing, with a combined sea trip on the *Europa* and a seaplane flight to Boston.

#### **Chamberlin Corp. Starts Operations**

THE Chamberlin Aircraft Corporation, of which Clarence Chamberlin is president, has leased Hangar No. 4 at Floyd Bennett Field, New York City, and started operations. With its regular hangar business, the company plans to operate an approved flying school, mechanics' course, and an approved service station.

B. D. Adams, formerly assistant sales manager of the Detroit Aircraft Corporation, is Mr. Chamberlin's assistant, and O. Y. Fetterman, formerly manager of the Grosse Ile Airport, which is owned and operated by the Detroit Aircraft Corporation, is manager of the Chamberlin company at Floyd Bennett Field.

#### **Bendix Shows Gain**

THE Bendix Aviation Corporation reported recently that net profits for 1931, totaling \$1,555,478, exceeded those for 1930, which were \$1,183,860. The 1931 net income was equivalent to seventy-four cents a share on 2,097,663 capital shares, as compared with a 1930 net of fifty-six cents a share on the common stock. This gain was made in spite of extraordinary charges against income. In 1931 the deficit to surplus after dividends amounted to \$541,406; the 1930 corresponding figure was \$2,424,084. President Walter J. Buettner stated that 1932 expenses are running at an annual rate of about \$1,000,000 below that of 1931.

#### **Air Law Academy Meetings**

FRIDAY evening informal meetings have been held weekly since March 4 by members and friends of the American Academy of Air Law at the national headquarters, New York University School of Law, Washington Square East, New York City. Aeronautical oil paintings of historical interest from the John R. Holland collection are on exhibition at the meetings, which are held from 7 to 10 o'clock. A large group of books and documents forming the library of the academy are open to examination by those interested in aviation.

#### **Jobs Campaign Progressing**

ACCORDING to latest reports, a large number of positions have been opened to the unemployed through the efforts of the campaign of the American Legion, the American Legion Auxiliary, the American Federation of Labor, and the Association of National Advertisers. With the backing of President Hoover and men prominent in industry, the campaign has for its object the securing of employment for 1,000,000 workers who are now unemployed.

#### **Form Scenic Airways, Inc.**

SCENIC AIRWAYS, INC., has been organized at Pocatello, Idaho, to specialize in tourist sight-seeing charter trips. The company is also equipped for air taxi and air ambulance service, aerial mapping and photography, and student instruction. Equipment includes a Fokker Universal seven-place cabin monoplane and a Swallow three-place open biplane. Dr. W. W. Brothers is president of the company, and F. H. Christensen, manager and chief pilot.

#### **Acquires Safety Nut Rights**

THE B-B Nut Company of Philadelphia, Pa., has acquired the sole licenses for the United States, Canada, and Mexico of all patents of the Safety Nut Corporation of Philadelphia. The B-B Nut Company will be in production on its new Brake-Band Nut in a short time.

(Continued on following page)



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*The Aviation Parts and Supply House*

(Continued from preceding page)

### Berry Brothers Elect Officers

JOHN C. WITHERSPOON, for many years a director of Berry Brothers, Detroit, manufacturers of paints, varnishes, and lacquers, has been elected to the presidency of the organization, succeeding W. R. Carnegie. Mr. Carnegie has been treasurer of Berry Brothers twenty-five years and president and general manager ten years. Thurlow J. Campbell, newly elected vice president and general manager, has been successively sales representative, New York branch manager, and superintendent of eastern branches of Berry Brothers.

C. L. Forgey, who has been in charge of Berry Brothers advertising for sixteen years, is now general sales manager as well as advertising manager. The board of directors, in addition to the officers of the company named, includes H. L. Stanton, chairman; Frederick L. Colby, Jr.; Thomas B. Colby, George H. Klein, and Joseph B. Sherrard.

### Boeing Teacher Invents Device

HOWARD B. KASTER, who is in charge of courses in aviation and meteorology at the Boeing School of Aeronautics, Oakland Municipal Airport, Calif., has invented the Spherant as an aid to the solution of the spherical triangle. The device has been accepted by the Bureau of Aeronautics of the U. S. Navy Department.

The Spherant makes possible the solution of the spherical triangle during the observation mechanically, just as the slide rule solves the problems in multiplication or division mechanically. This eliminates the long period of technical training formerly required and minimizes the possibilities of error. The new device gives the desired quantities directly without complicated tables, except the Nautical Almanac.

Mr. Kaster majored in engineering and astronomy at the University of California. He later took his master's degree there and served as a part-time assistant in the astronomy department. In 1926 he took charge of the development of the Naval Reserve ground school courses in meteorology and navigation at the university.

The following year he organized a course in sea and air navigation and astronomy at Pomona College. Mr. Kaster received the Morrison Research Fellowship in Astronomy at the University of California in 1929 and continued his study there. He is a member of the U. S. Naval Institute, the American Society of Naval Engineers, and of the national honorary science fraternity, Sigma Xi.

### Changes in Air Races

MANY events at the National Air Races in Cleveland next summer will be flown over a new type three-mile oval course, according to a recent announcement. The straightway sections will be

parallel to the grandstand, with gradual turns at the pylons. The new course, the first of its type and length to be used in American air races, will enable all pylon turns to be made at the same angle. The Thompson and Aerol Trophy races will be flown over a ten-mile triangular course similar to that of previous years. The Cleveland Municipal Airport will be closed during these events.

For the first time in the National Air Races a series of handicap closed course races will be flown for planes carrying Approved Type Certificates or Group 2, Department of Commerce, licenses. These will be held in addition to the transcontinental handicap derby and will supplement the free-for-all events which will be featured at the races. Both handicap closed course and free-for-all contests will be classified according to cubic-inch displacement, with eight events in each group.

Other competitions will include speed and efficiency contests for multi-motored craft and planes with single engines, an autogiro competition, a race for National Guard planes, amphibion races, sportsmen pilots' contests, and dead stick landing, precision parachute, and novelty race competitions.

### Flying Instruction on Club Plan

THE Manhattan Flyers, Inc., of Glenn Curtiss Airport, North Beach, N. Y., have instituted flight instruction on the club plan. Equipment includes a Stinson four-place cabin plane, a Taylor Cub, and a Fairchild "22." A system of instruction is used that is reported to enable a student to solo after eight hours' dual instruction.

### Fuel Oil Motors Engages Noville

FUEL OIL MOTORS CORP. has announced that Lieut.-Commander G. O. Noville has been engaged as chief consulting engineer in the aeronautical field. Lieut.-Commander Noville was formerly superintendent of the U. S. Air Mail service and later chief aid and engineering adviser to Admiral Byrd in his notable flight and exploration expeditions.

### Keystone Supplies Air Corps

THE Keystone Oil Refining Co. of Detroit, Mich., the largest refinery exclusively producing motor oils that are re-refined from crankcase drainings, was awarded contracts recently for supplying the following U. S. Air Corps stations:

Chandler Field, Ft. McPherson, Ga.; Chanute Field, Rantoul, Ill.; Lawson Field, Ft. Benning, Ga.; Maxwell Field, Montgomery, Ala.; Selfridge Field, Mich.; Wright Field, Dayton, O.; Hatbox Field, Muskogee, Okla.; Fairfield Air Depot, Osborn, O.; Biggs Field, Ft. Bliss, Tex.; Ft. Crockett, Galveston, Tex.; Randolph Field, Texas.

The gallonage totals 60,000. Shipment is for three months.

### Goodyear Reports "Macon" Progress

WITH the raising of the sixth main frame, the duralumin skeleton of the *Macon* attained a length of more than 350 feet, and the after portion of the hull was nearing completion, according to a report by the Goodyear-Zeppelin Corp. late last month. Work was also well under way on construction of the ship's fins, to which the movable control surfaces necessary to guide the craft through the air are affixed.

A different procedure from work on the *Akron* is being followed on the *Macon*. For test purposes and other reasons it was necessary to start amidships and erect the forward part of the hull of the *Akron* first. Starting forward of amidships on the *Macon*, construction has been carried on toward the stern. The main frame recently erected is the last and smallest in the after part of the hull structure, and there remains only attachment of the cone-shaped stern section and the fins to complete this portion of the ship.

When completed, the entire hull of the *Macon* will have a total of eleven main frames, spaced approximately seventy-four feet apart in the central portion of the ship. All but one of them are triangular in cross-section, being composed of two outer annular rings joined to an inner annular ring by a system of girders in zigzag fashion, and are connected to each other by a series of thirty-six longitudinal girders. Spaced at intervals between the main frames are intermediate frames of single-girder construction.

Both the main and intermediate frames are built in a horizontal position in jigs set on the floor of the dock. After being assembled, they are raised from the jigs to a vertical position and set in steel "cradles" the proper distance from the next main or intermediate frame. The frames are then joined by the longitudinal girders.

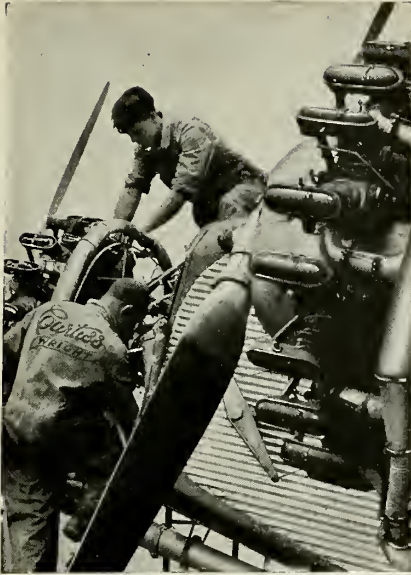
As construction of the hull progresses, installation of the ship's three keels is being made. The keels, also triangular in cross-section, provide means for the crew to travel from one end of the ship to the other and are the "backbones" of the hull. One of the keels is located along the top center line, while the others are located, one on each side, about forty-five degrees from the bottom center line.

### L. S. Thompson Trophy Goes to England

THE L. S. Thompson Speed Trophy will be awarded to Flight Lieut. George H. Stainforth of the British Royal Air Force, in recognition of his having established the world's speed record of 406.997 miles per hour. In a Supermarine S-6B monoplane, powered by a Rolls-Royce engine, Flight Lieutenant Stainforth made the record on September 29, 1931, shortly after the Schneider Trophy race.

(Continued on following page)

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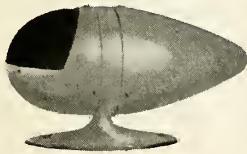
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(Continued from preceding page)  
**Colonel Thurman H. Bane**

COLONEL THURMAN H. BANE, pioneer of American aviation and director of scientific research which brought America world leadership in the air, died last month.

Shortly after the World War, Colonel Bane, who had been head of the Technical Section of the Bureau of Military Aeronautics during the war, assumed command of the engineering and research base at McCook Field, Ohio, where many advancements in aeronautics were made under his direction.

In 1922 Colonel Bane retired from the Army and entered the commercial field as a consulting engineer in California. He assisted in the organization of the Aviation Corporation in 1928 and became vice president. He directed the development of the 9,387 miles of scheduled airlines now controlled by the Aviation Corporation, and under his supervision the network was lighted for night flying, equipped with a model airways weather reporting system and with complete radio facilities.

#### **Medal for Post and Gatty**

THE Senate recently passed a resolution authorizing President Hoover to award gold medals to Wiley Post and Harold Gatty in recognition of their 'round-the-world flight achievement. The resolution was referred to the House Committee on Coinage, Weights, and Measures.

#### **Weems Book to Enter Contest**

LIEUT.-COMMANDER P. V. H. WEEMS' book, "Air Navigation," has been chosen to enter the competition of the Aero Club of France for the best aeronautical book published during the past year in a language other than French. Lieut.-Commander Weems is stationed in the Hydrographic office at Washington.

#### **Flight Lessons in Installments**

THE Service Flying Field of Baltimore, Md., is giving flying instruction on the "pay as you fly" plan, with a stated charge for each of the fifty lessons in the private pilot license course. The equipment includes two Curtiss Robin planes, two Davis planes, one Fleet, one Travel Air, one Taylor, and one Aeronca. The Baltimore organization also acts as distributor for Taylor Brothers Aircraft Co., Inc., of Bradford, Pennsylvania.

#### **Do-X to Return Home Soon**

CAPT. FRIEDRICH CHRISTIANSEN, commander of the Do-X, was reported recently to be preparing to return to the United States from Germany to take the flying boat back to Germany. The plane is expected to leave North Beach, New York, some time next month, and it is planned that it will be in Germany in time to attend the Kiel regatta

in June. A tentative route for the trans-Atlantic trip has been set via Newfoundland, the Azores, and Portugal, closely following the NC-4 route in 1919.

The twelve engines of the Do-X have been increased from 600 horsepower to over 650 horsepower each. Greater load concentrations of fuel will be possible through the strengthening of part of the internal bracings of the boat structure.

#### **Designs Fast Amphibion**

A LOW-WING, all-metal amphibion monoplane, reported having speeds of 180 to 215 miles per hour, is being built at the Edo Aircraft Corp. factory, College Point, Long Island, N. Y., by Major Alexander P. Seversky, consulting engineer for the U. S. Air Service, and former Russian ace.

Major Seversky said recently that the ship, the Seversky SEV-3, is more than half completed and would be flown within a few weeks. He stated that the amphibion is designed to carry from two to four persons and is stressed to take in engines from 400 to 600 horsepower. The cruising radius of the plane will be about 700 miles. The amphibion is so designed that within an hour or so it can be converted into a landplane with a high speed of from 200 to 240 miles per hour.

#### **Plan Ocean Flights**

A NEW Bellanca monoplane was tested last month in preparation for a non-stop flight from the United States to Japan by two members of the Japanese Army Reserve Corps. The fliers, Captain Y. Nagoya and Sgt. K. Ashai, are reported to plan to cross the Pacific within a few weeks to win a \$25,000 prize offered by the Tokio newspaper, "Hochi-Shimbun."

The plane is similar to the one in which Pangborn and Herndon flew from Tokio to the United States last year to win another award offered by the paper. The ship is fitted with 1,100-gallon capacity fuel tanks and has a 450-horsepower Wasp engine.

Capt. Karl Hamm has announced that he will attempt a twelve-hour flight from Berlin, Germany, to New York next August. Captain Hamm, who is a former German army aviator, will fly in a plane powered with a newly invented gas and steam turbine engine.

#### **Committee Finds "Akron" Flawless**

DESPITE a previous announcement that no report would be written on the *Akron*, the Congressional committee investigating alleged defects in the airship closed its investigation with the report that there is now no faulty material nor poor workmanship in the *Akron*. The report, which was presented March 11, pointed out that no direct testimony had been given by any person having firsthand information regarding the charges, except the Navy representatives.

#### **Graf Zeppelin Starts 1932 Schedule**

THE *Graf Zeppelin* made the first of a 1932 series of flights from Friedrichshafen, Germany, to Pernambuco, Brazil, March 21-23, in the first regularly scheduled airship passenger service ever undertaken. It marked the opening of the first regular trans-oceanic service by any aircraft. The trip was made in a little over sixty-eight and one-half hours, the airship arriving at Pernambuco three minutes late.

#### **New Italian Flying Rules**

AMERICAN aviators flying over Italy will be subject to new regulations as the result of consultations between the American Embassy at Rome and the Italian Air Ministry. The new rules dispense with the necessity for special permission for an American registered airplane to fly into or over Italian territory; they require the sending of an advance message by wire to the customs airport at which the aviator plans to land for customs inspection; they provide for communication directly with the American Embassy, if any special assistance is needed, and if permission is desired for the carrying of articles such as arms and cameras.

It is emphasized that persons making flights over Italian territory in American aircraft must comply with the air navigation rules and regulations in force in that territory which are contained in "Rules for Aerial Navigation" approved by royal decree as of January 11, 1925. These rules require, in particular, avoidance of forbidden zones; following compulsory routes over designated areas; landing at customs airports when first arriving in Italy and before leaving; possession of documents required for aircraft, engine, and personnel; and avoiding the transportation, without special permission, of arms, cameras, etc.

#### **Packard Awarded Collier Trophy**

THE COLLIER Trophy for 1931 was scheduled to be presented March 31 to the Packard Motor Car Co. for the development of the Diesel aircraft engine. President Hoover was to make the award to Alvan Macauley, president of the company, in recognition of "the greatest achievement in aviation in America, the value of which has been demonstrated by actual use during the preceding year."

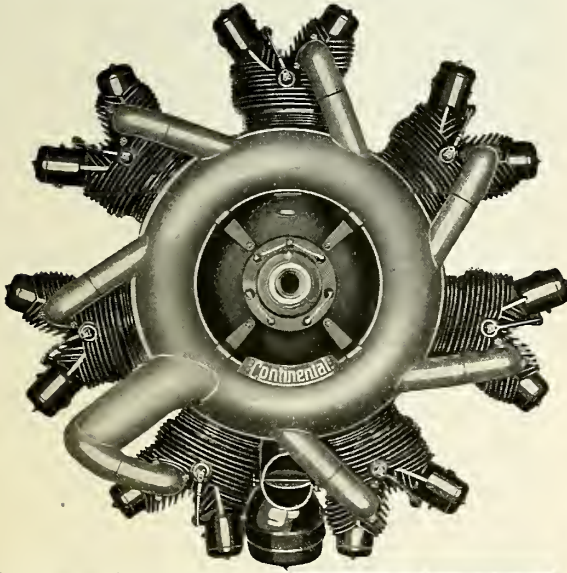
The Packard Diesel engine was used in establishing the airplane world's duration, non-refueling record early in 1931. During the last year the Packard Diesel was successfully adapted to use with lighter-than-air ships, and two of the engines were installed in the Goodyear non-rigid airship, *Defender*. Clarence Chamberlin and Ruth Nichols recently established altitude records in a Lockheed Vega plane, powered with an unsupercharged Diesel engine.

(Continued on following page)

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Continental Aircraft Engine, model R-670, Approved Type Certificate #80, has been adopted as standard equipment by several of the better known airplane builders. (Their names will be supplied upon request.) ¶ The Continental institution, despite generally prevailing conditions in every industry, has ample cash resources, no outstanding bonds, no preferred stock and no bank loans. It is, therefore, free to devote its entire energies to the design and production of fine engines. ¶ There is complete Continental Service Station coverage throughout the nation, providing prompt, efficient attention and service parts. ¶ That is why the name "Continental" guarantees real performance and a dependable, economical source of supply.

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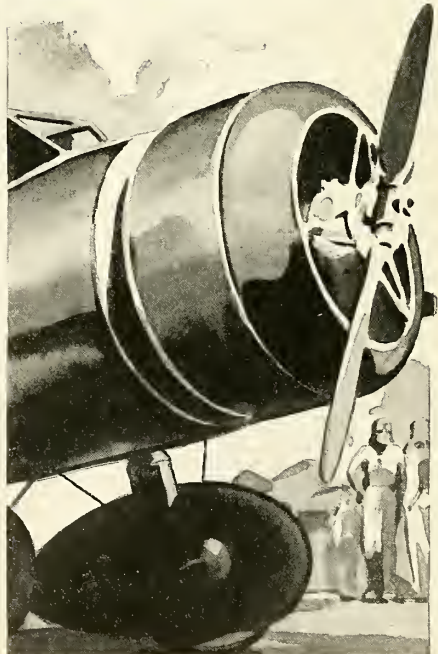


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**CONSOLIDATED AIRCRAFT CORPORATION • BUFFALO • N. Y.**

(Continued from preceding page)

## NORTHEAST

AN amateur aerial photography contest is being planned by the Aero Club of Pennsylvania. The contest arrangements are being handled by the club's program committee. According to tentative plans, the contest will be divided into two classes, the first group to consist of pictures taken from the air and the second group to be made up of photographs taken on the ground of aeronautical subjects.

A 5,000-MILE airplane trip recently was completed when Lewin B. Barringer, flying a Waco cabin plane, landed at Wings Port, near Ambler, Pennsylvania. Accompanying Mr. Barringer on the flight, which took him from that field to the Meteor Crater in Arizona and back, were Miss Mary G. Henry, daughter of the Philadelphia director of public health; Miss Margaret Fassitt, and Miss Katherine Krebs. The first vertical photographs of the crater to be taken from the air were made by Mr. Barringer, who took some of the pictures by moonlight.

THE Jacobs Aircraft Engine Corporation has entered into a full production schedule at its factory, which is located at Central Airport, Camden, New Jersey. A production schedule of twenty-five engines per month is being maintained, with a steady delivery of products being made to airplane manufacturers. A number of the Jacobs fifty-five-horsepower engines already have been delivered to aircraft manufacturers.

The seven-cylinder, 170-horsepower engine is one of the most popular to be developed by the company. The unusual demand for this type has delayed production of a new engine of 195 horsepower, which recently was granted an Approved Type Certificate by the Department of Commerce.

WARREN E. EATON, Norwich, N. Y., president of the new American Soaring Association, Inc., has announced the association will sponsor the national gliding and soaring contests July 18-31. Elmira has been selected tentatively for the meet because of excellent weather conditions which prevail there. Other officers of the group are: Vice president, Augustine Haller of Pittsburgh; secretary, treasurer, and managing director, Arthur Lawrence of Providence, R. I.

HAROLD SCOTT, pilot for Utica, N. Y., Flying Service, carried inspecting linemen from the Utica Gas & Electric Company to check up on trouble on outlying lines after the blizzard of the week of March 6. The same week the flying service contracted with the company to carry on inspection work on a year-round basis.

CONSIDERABLE business in the form of fishing and hunting parties and emergency flights has been received during the past winter by fliers making chartered flights in northern Maine. Otherwise inaccessible lakes have been made available for ice fishing, and a means of transportation has been offered sections temporarily isolated by heavy snowstorms.

THE Common Council of Norwich, N. Y., has leased the airport of Norwich Flying Service, Inc., for one year as a municipal airport. An option to extend the lease another year also was obtained. A total of 2,500 hours of work by local unemployed in improvement of the field will be given in return for the lease.

CONSOLIDATED AIRCRAFT Corp. of Buffalo, N. Y., recently announced the sale of a Model 21-C airplane, equipped with 300-horsepower Wasp, Jr., engine, to A. B. Echols, Wilmington, Delaware.

THE City Council of Bucyrus, Ohio, has ordered the purchase of the hangar at Port Bucyrus at a cost of \$2,700. Payment will be drawn from the city's airport fund.

C. E. ANDERSON has been appointed auditor of disbursements in the accounting department of the General Electric Company, Schenectady, N. Y., to succeed the late F. D. Kamerer, it has been announced by S. L. Whitestone, comptroller of the company. Mr. Anderson entered the business training course of the General Electric Company immediately after his graduation from Bentley School of Accounting in 1924. At the time of his new appointment he was assistant statistician of the company.

## SOUTHEAST

THE B/J Flying Club, an organization of the employees of the B/J Aircraft Corporation of Baltimore, Md., has purchased a new Aeromarine-Klemm for use in instruction work. The club, which is headed by Oliver Fraser, Jr., plans to begin instructions soon for its membership. Lee M. Rawlins, manager of the Baltimore Municipal Airport, is expected to become instructor.

FRED WILLIAMS has been placed in charge of the All-American Airways branch at St. Petersburg, Florida. The training school has been doing a capacity business with prospects of increasing this summer.

G. H. BROWN was elected president of the Tampa, Fla., Aero Club to succeed H. B. Elliott at the club's annual meeting. R. E. Burritt was chosen vice president, and Ray Newell, sergeant-at-arms.

THE equipment of the air unit of the Maryland National Guard, which makes its headquarters at Logan Field, has been completed through the addition of a Douglas O-38 bomber, equipped with new type wing lights and special vanes on the aileron controls, which can be adjusted to compensate for slight defects in rigging.

The air unit maintains a ground school which was started last December. The school is divided into sections, among which are supply, transportation, communications, armament, and engineering, the latter including ignition, carburetors, and rigging.

ROSS HADLEY, Los Angeles aviator, won the twenty-five-mile free-for-all airplane race, feature event of a two-day air circus at the Daytona Beach, Fla., Municipal Airport, March 1. Roscoe Brinton of Springfield, Mass., was second, and Fred Brohan, New York City, third. The circus was staged by Richard Bennett of Binghamton, N. Y., and Russell Brinkley, N. Y., in honor of Sir Malcolm Campbell.

ACTING on the announcement of Captain Shepherd of the Goodyear Company that it contemplated establishing balloon lines to South America, Manager Denegre of the Tampa, Fla., Municipal Airport, has made preliminary plans to move an \$85,000 government balloon hangar from Massachusetts.

## NORTH CENTRAL

A GENERAL ELECTRIC 1,500,000-candlepower rotating beacon, with automatic lamp charger, and one code beacon with two 500-watt G-40 lamps have been erected on a steel tower, fifty-five feet tall, about 1,000 feet southwest of the city hangar at the Williamson-Johnson municipal airport at Duluth, Minn.

ANDREW J. HUFFORD, member of the first Wilkins polar expedition and until recently chief motor mechanic for the Northwest Airways, Inc., of St. Paul, Minn., is now with the Aeronautics Branch of the Department of Commerce in Washington. He has been succeeded by Ray J. Maher, whose assistant is M. E. Leadon.

THE Duluth, Minn., Aviation Club has been organized to promote the interests of aviation within the city. Officers elected are: President, Howard D. Bush; vice presidents, L. O. Anderson and Stephen R. Kirby, Jr.; secretary, Guilford Hartley, and treasurer, Edward J. Soukup. An air meet and air tour will be sponsored during the year in addition to improvements at the airport and sea-plane base.

(Continued on following page)

# SERVING AVIATION IN THE WEST

as SALES and SERVICE  
Representatives for

**WRIGHT**

"Whirlwind" Engines

**PRATT & WHITNEY**

Aircraft Engines

**KINNER**

Aircraft Engines

**WARNER**

Aircraft Engines

**SCINTILLA**

Aircraft Magnetos

**STROMBERG**

Aircraft Carburetors

**BENDIX**

Wheels and Brakes

**ECLIPSE**

Starters and Generators

**HAMILTON STANDARD**

Steel Propellers

**BERRY BROTHERS**

Aircraft Finishes

**ELGIN**

"Avigo" Instruments

**AEROL**

Landing Struts

(Approved Repair Depot No. 88)

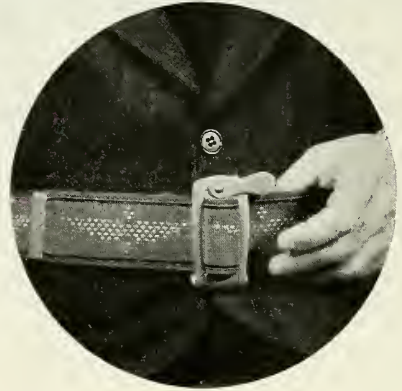
**PACIFIC AIRMOTIVE CORP., Ltd.**

United Airport, Burbank, Calif.

Los Angeles Airport  
INGLEWOOD, CALIF.

Oakland Airport  
OAKLAND, CALIF.

## The New Rusco SAFETY Belt Buckle



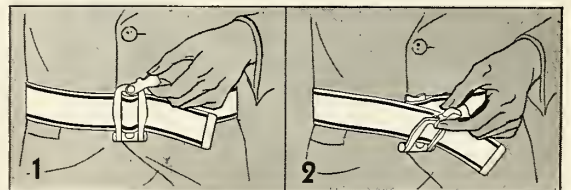
Automatically adjustable at  
time of fastening

THE new Rusco safety belt (patent applied for) reduces the adjustment and fastening of safety belts to one operation—simply slipping the loose end of the belt through the buckle. Whether the passenger is a 90-pound girl or a 250-pound man, correct and comfortable fit can instantly be secured without awkward adjustments at the side of the seat or otherwise altering the length of the belt.

Equally important, the new Rusco safety belt buckle is the quickest and simplest of all buckles to release. A flip of the finger releases the catch, completely freeing the belt.

Rusco Buckles are handsomely finished in chromium plate, and each buckle is tested to 2,000 pounds in accordance with Department of Commerce regulations for double passenger loads.

Belts may be obtained in various attractive applique designs, in all popular colors, to harmonize with cabin fittings. Special fittings for retracting the belt beneath seat when not in use also are available. Write for particulars or see belts and buckles on the new planes at the Detroit Aircraft Show. The Russell Manufacturing Company, Dept. D-1, Middletown, Conn.



Released by the flip of a finger—(1) Raising horizontal lever releases buckle catch. (2) Buckle falls open and completely frees belt. No danger of accidental release.

ARTICLES of incorporation have been filed by the Inter-State Airways Service of Cumberland, Wis., to operate airplanes for commercial and stunt flying and to direct a flying school. Incorporators are William Nyman, A. J. Hilton, and C. H. Jacobson.

THE Morey Airplane Co. has leased the airport field and five hangars of the Royal Airways Corp. in Madison, Wis., to establish an airplane repair service, to continue instruction classes, and to make passenger flights. Capt. Howard Morey, president of the company, has been engaged in airplanes and airport operation in Madison since 1925.

PARKS AIR COLLEGE of East St. Louis, Ill., has instituted an executive aviation course with the theme of the application of flying to business and of business methods to aviation. In twenty-eight weeks of intensive work it covers economics of airline location, salesmanship, airport design and management, sales promotion, and a variety of other business subjects.

Four states—Michigan, Pennsylvania, Florida, and Iowa—are represented by six students who have graduated from the mechanics course at the college during the past month. Forty-eight states, fourteen foreign countries, Alaska, Canada, and the District of Columbia are represented among the 1,151 students who have graduated from the college during the past four years. Illinois leads in the number of graduates with 156. Missouri is second, with 128, and Pennsylvania, third, with 107. Among the foreign countries represented by the school's graduates are Siam, India, Germany, Norway, Spain, and Poland.

THE State Air Board of Michigan has authorized the expenditure of \$250 for the purchase of paint for airmarking purposes. It is the intention of the Board to airmark every town within a ten-mile belt along the Detroit-Chicago and Detroit-Grand Rapids airways. The State Board will make a survey of all towns desired to be marked and recommend locations and furnish specifications for the lettering.

## SOUTH CENTRAL

KANSAS CITY, MO., is now one of the four distribution points in the United States for weather maps designed for air transport use, with the completion of the new Weather Bureau headquarters at the Kansas City Municipal Airport. The territory to be served by the Kansas City Bureau includes the area between eastern Utah and Chicago. Dallas and Omaha will serve as centers for the collection of data on weather conditions in smaller communities, which will, in turn, be sent

by teletype system to Kansas City. This information, with that collected for the Kansas City area, will be transmitted daily in weather maps. The equipment is housed in a room adjoining the Weather Bureau office at the Kansas City Airport.

KANSAS CITY has been selected as headquarters for the seventh corps area of the Betsy Ross Corps, with Miss Dorothy Lyon as lieutenant-commander of the Kansas City headquarters. About twelve applications have been received for the flight training and other instruction necessary for membership in the parent organization. Capt. Willfred G. Moore will be in charge of the training. Capt. William B. Wright, Jr., head of the Air Corps base at Kansas City, and other Air Corps reserve officers at the Kansas City Airport have assisted Miss Lyon in preparing for the unit. The Betsy Ross Corps has been organized to perfect a reserve group of women fliers capable of replacing men pilots in time of war or for other emergency flying.

THE Longren Aircraft Corporation at the Kansas City Airport has completed preliminary load tests on the fuselage of their metal biplane which has been in process of manufacture for some time. The fuselage showed no indication of damage under the load of 19,300 pounds placed upon it. Previous static tests of the wings with a load between 13,000 and 14,000 pounds have shown no lasting effect. The new plane, designed and built by A. K. Longren, is of all-metal construction except for the wing spars and seat coverings.

STEADHAM ACKER, manager of the Birmingham, Ala., Airport, was elected president of the Birmingham Aero Club at a meeting recently. Asa Rountree, Jr., Leslie Meadows, and Mrs. A. R. Clark were chosen as vice presidents, and Phillip A. Roll, executive secretary and treasurer. Members selected for a board of governors were: Theodore Swann, Hayden Brooks, John C. Persons, L. E. Geohegan, F. M. Jackson, H. F. Wood, Matt Lawson, Leander Poole, Ralph Hurst, Bob Bauman, W. A. Steadman, and E. H. Smith.

WILLIS THOMPSON is the new Birmingham, Ala., traffic representative for American Airways. He came to Birmingham from Amarillo, Dallas, and Ft. Worth, Texas. Downtown offices were opened recently at the Tutwiler Hotel in Birmingham.

AUBREY KEIF has been appointed manager of the Curtiss-Wright Flying Service at both Memphis, Tenn., and Oklahoma City, Oklahoma. He will supervise operations in both cities. He is succeeding K. E. Yoder.

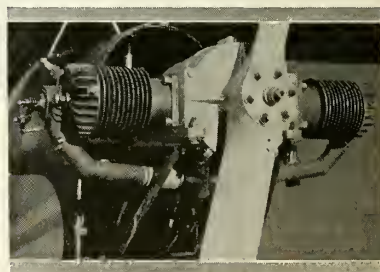
REORGANIZATION of the Oklahoma Aviation Service, Inc., and an extension of the company's services were announced March 8 at Oklahoma City by C. T. Johnson, who will continue in charge as president and general manager. Other officers of the company are William E. Bleakley, vice president; E. Todd Nelson, secretary-treasurer, and Harvey P. Everest, chairman of the board.

A new hangar of the company at Oklahoma City municipal air terminal will be enlarged to include an engine overhaul shop and a room for repairing and recovering planes.

Oklahoma Aviation Service is sales representative for the Curtiss-Wright and Spartan planes and offers student training in a twenty-hour private license course and a fifty-hour limited commercial course.

## NORTHWEST

THE LONG B-87 light airplane engine, designed by Les Long of Cornelius, Ore., is of the air-cooled two-cylinder opposed four-cycle type. The engine develops thirty horsepower at 2,500 r.p.m. and weighs ninety pounds with propeller hub. The crankcase and pistons are of aluminum alloy, and the two-throw crankshaft is of chrome vanadium, entirely machined. Bearings are SKF, and gears, rods, and other working parts are of nickel steel.



Ignition is by Bosch or Simms magnetos, and a Winfield carburetor is provided. Lubrication is supplied to all bearings by a high-pressure gear pump and scavenged by a separate gear pump. Oil consumption is unusually low.

The propeller is five feet two inches in diameter, has a thirty-inch pitch, and turns up 2,700 r.p.m.

The type D Longster monoplane has a span of thirty feet. Powered with the B-87 engine and with a loaded weight of 575 pounds, it takes off in 100 feet, has a high speed of eighty-five miles per hour, and climbs at the rate of 900 feet per minute.

REORGANIZED and with four planes ready for work, the Western Aero Dusting Company of Portland, Ore., is preparing for a busy year of dusting crops



**SPEED and  
ECONOMY  
of AIRCRAFT assembly  
INCREASED with  
HARTSHORN  
TIE RODS**



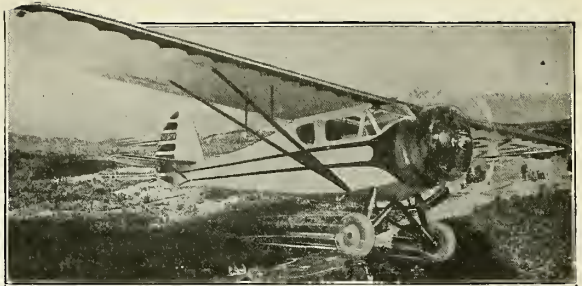
Square Section Tie Rods can be adjusted with the wrench applied anywhere along the rod. Tight corners are no longer troublesome. The flat faces permit making rods fast at intersections. A glance along the rods shows up even the slightest torsional strain.

Streamline Tie Rods are light and very strong. They offer little resistance to the wind, thereby increasing speed and decreasing fuel consumption.

Hartshorn Streamline Tie Rods are now regularly available in non-corrosive 18% chromium—8% nickel stainless steel. They are highly polished and far exceed the standard 700 hour salt spray test.

*See our Exhibit at Booth 102  
Detroit Show*

**Hartshorn** AIRCRAFT  
TIE RODS  
Est. 1860  
**STEWART HARTSHORN CO.**  
250 Fifth Avenue, New York, N. Y.



*The Monocoupe*

*Program for 1932*

WE BELIEVE THE PRIMARY purpose of an airplane is to render fast, economical transportation with the utmost comfort. We will adhere to designs which discriminate between merely airport use and highly efficient cross-country utility.

PRICES:  
\$2395 to \$8500.

TOP SPEEDS:  
115 miles per hour up to—well, maybe 200 miles per hour.

ENGINES:  
Velie M5; Lambert 90 h. p.; Warner 110h.p.; Kinner 100h.p.; 125 h. p.; 150 h. p.; and Wright Whirlwind J6-5 225 h. p.

TIME PAYMENTS:  
We hope to offer a conservative and sensible plan for deferred payments eliminating the excessive carrying charges.

AGENCIES:  
The present Monocoupe dealer and service stations are now augmented by Curtiss-Wright Flying Service.

MONOCOUCHE CORPORATION  
Lambert, Field  
ROBERTSON, MO.

(Continued from preceding page)

and orchards in Oregon, northern California, northern Nevada, Idaho, and parts of Washington, it has been announced by Leslie M. Boyd, president. The firm has four Eaglerock ships equipped with hoppers. A twenty-acre field is being developed in Portland, and preparations are under way to establish twenty-eight field depots in the various districts where work is to be done. Eight large contracts already have been received for work this year, Mr. Boyd reported. The Western Aero Dusting Company is an outgrowth of the Northwestern Aero Dusting Company, started at Portland three years ago by Mr. Boyd. The company is incorporated as an Oregon firm. M. N. Eben is secretary-treasurer.

TWO customs department rulings were received recently by J. E. Daniels, deputy collector in charge of customs at Spokane, Wash. These rulings designate new airharbors in British Columbia and give the information that Felts Field may become a permanent airport for international service, instead of a temporary port with requirement that the temporary permits be renewed at intervals. The airharbors designated in British Columbia are Cranbrook, Fernie, Grand Forks, Trail, Vernon, and Vancouver. This means that American planes may now fly to any of these ports and receive clearance. Seaplane ports also are created at Trail and Vancouver. Felts Field's temporary license expires in June. By showing that the equipment of the field is satisfactory, the license can be made permanent.

AIRPORT traffic has shown a marked increase at the Tacoma, Wash., Field, since the first of the year, with six transport planes, four on the Seattle-San Diego run and two on the Seattle-Salt Lake route, landing there daily. Beginning April 1, additional ships will make this their port of call.

THE Redmon-Skinner Air Service, Inc., at Yakima, Wash., has changed its name to the Redmon Air Service, Inc. Its capitalization is \$15,000.

A FILE of AERO DIGEST and other flying magazines has enriched the library of the University of Washington of Seattle. This collection of contemporaneous aviation data has been presented to the library of the university by Ivar Ingelsrud, teaching fellow in chemistry, who is an aviation enthusiast.

THIS year a new course in aerodynamics has been added to the aviation department of the Washington State College at Pullman, Wash., under Prof. F. W. Condec. Aviation has been taught for the last five years at the college.

## SOUTHWEST

THE sales and flight instruction division of the Varney Air Service, Ltd., has been sold to Capt. Joseph R. Hargrove, former Varney sales manager. The new concern, to be known as the Hargrove Air Service, will take over the distribution of Stearman, Stinson, Waco, and Viking planes. Headquarters will be maintained at the San Francisco Bay Airdrome. Varney Air Service, Ltd., is to concentrate its attention on air transport operation and aircraft manufacture, according to Franklin Rose, president.

CENTURY PACIFIC LINES recently announced a twenty per cent reduction in air express rates between the San Francisco Bay region and coastal points.

AIRPLANE dealers at United Airport, Burbank, Calif., comprising distributors for the country's leading aircraft manufacturers, report increased sales of two planes for the first month of 1932. Ninety-eight planes were sold from this airport in 1931.

F. A. GALLIGAN, who recently was appointed western representative for Fairchild planes, has leased office space at the San Francisco Bay Airdrome. He was formerly an official of the Curtiss-Wright Corporation. Chan Keeny has been employed as chief demonstration pilot.

ROYLE-ANDREWS AIR SERVICE has transferred its base of operations from Curtiss-Wright Alameda airport to San Francisco Bay Airdrome.

THROUGH the courtesy of postal officials, last-minute letters for northbound and southbound daily mail planes will be received at the San Francisco Bay Airdrome, Alameda. First-class mail brought to the United Air Lines ticket office in the airdrome waiting room before noon will be dispatched on the northbound tri-

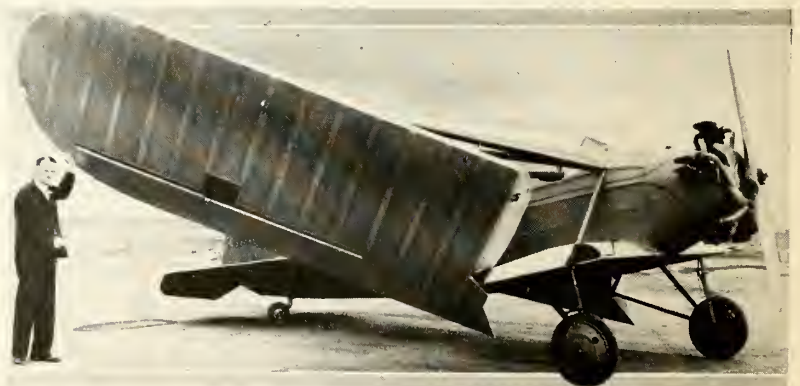
motor at 12:05 p.m. Letters received at the ticket office prior to 3:45 p.m. will be flown to Los Angeles and San Diego on the southbound mail plane, leaving at 3:50 p.m. This arrangement will permit a much later sending of emergency mail than can be done through the regular postal channels.

A TWO-PLACE folding low-wing monoplane powered by the 100-horsepower Kinner engine will be exhibited at the Detroit Show by W. B. Kinner, head of a new organization which is to produce and sell the plane. The plane will be sold on an optional time payment plan, requiring no insurance, since the new company will assume its own risk. The firm is located at Grand Central Airport, Glendale, California. Mr. Kinner, who has been experimenting with the new plane for the past two years, is the founder of the Kinner Airplane & Motor Corporation.

The new plane will feature a folding wing mechanism which will enable users to store the ship in a space nine feet wide. Seating in the plane is side by side, an ideal arrangement for both training and pleasure flying. On account of the position of the seat (midway above the wing) excellent visibility is afforded. The plane is equipped with a full set of instruments and a unique braking system operating independently on each wheel. dual controls, Story propeller, and tail wheel.

### Specifications

Wing span .....	36 feet
Overall length .....	24 feet
Overall height .....	8 feet
Wing chord (tapered).....	5 ft. 6 in. (mean)
Wing area.....	200 square feet
Weight, empty .....	900 pounds
Useful load .....	700 pounds
Gross weight .....	1,600 pounds
Wing loading .....	.8 lbs. per sq. foot
Power loading.....	16 lbs. per horsepower
Oil capacity .....	3 gallons
Fuel capacity .....	25 gallons
Cruising range .....	350 miles
Power plant (Kinner).....	100 horsepower
High speed.....	110 miles per hour
Landing speed.....	35 miles per hour
Climb (first minute).....	1,200 feet
Absolute ceiling .....	20,000 feet



Kinner folding-wing monoplane

THE LOWEST PRICE EVER MADE



\$2295

WITH KINNER K5

\$2995

WITH WARNER SCARAB

\$300 for De Luxe Equipment which includes

EXHAUST ring on D-1K, Townend ring and wheel pants on D1-W, Aerol shock struts, Aircraft Products wheels with 6.50 x 10 semi-balloon tires, air speed, compass, front cockpit enclosure, tunnel type windshield, rear cockpit shields.

Aircraft Products wheels with brakes and semi-balloon tires, \$175 extra. Hamilton Standard steel propeller, \$200 extra.

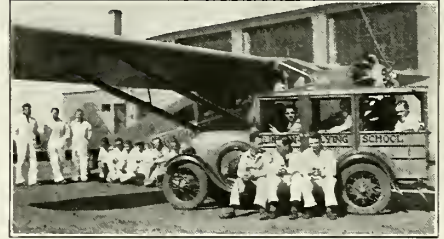
# DAVIS MONOPLANES

DAVIS Monoplanes have proved their claim to the best performance in their class in all manner of competition, for the past four years. Their economy and stability for the student pilot and speed and maneuverability for the sportsman are recognized. This is the lowest price ever quoted on an airplane of this class equipped with the Kinner K-5 or Warner Scarab engines.

DAVIS AIRCRAFT CORP.

Richmond, Indiana

# The BEST AVIATION TRAINING Money Can Buy!



LOOK into the future. Will you be a success? Naturally you cannot tell. But you can greatly influence your future by selecting a course of procedure. If you are interested in Aviation, and can afford to take training—either as a Pilot or Mechanic—so much the better. For Aviation offers the world's greatest opportunity!

In Aviation primary training is more important than in any other business. For mistakes cannot be corrected in the air! So the very best kind of training is none too good for the young man who wishes to make Aviation his career.

We offer you the BEST TRAINING MONEY CAN BUY. This does not mean that our tuition is extra expensive. It means that nowhere else can you get better training on more complete, modern equipment—regardless of how much you pay.

Lincoln tuition is not the most expensive. Nor is it the cheapest. Our students describe it as being "reasonable"!

Let us send you complete information about Lincoln training and equipment, and our list of tuition charges.



Airplane & Flying School  
CATALOG ON REQUEST

Approved by U. S. Dept. of Commerce as Private, Limited Commercial and Transport; both Flying and Ground School.



Contains full information about Lincoln School, tuition charges, etc.

## MAIL COUPON NOW!

LINCOLN AIRPLANE & FLYING SCHOOL, 300-B Aircraft Bldg., Lincoln, Nebr.

Gentlemen: Please send Catalog containing full information about Lincoln School, tuition costs, etc.

Name..... Age.....

Address.....

Town..... State.....

## TRADE LITERATURE

### *New Pamphlets and Books of interest to the Aeronautical Industry*

#### *Air Associates Catalog*

**A**ERONAUTICAL equipment ranging from books on aviation to goggles is pictured and described in a new catalog prepared for wholesalers by Air Associates of Garden City, N. Y., and Chicago. Complete information is given regarding prices, terms, and specifications of merchandise. The plentiful illustrations add interest and clarify descriptions of equipment.

#### *Stanavo Fuel Chart*

THE Stanavo Specification Board, Inc., has announced the publication of a chart of fuel recommendations for aviation engines, the first chart of its kind to be published. Stanavo engineers have been preparing this data for nearly a year. It represents a valuable contribution in fitting the fuel to the engine and is designed to be of assistance to airline executives, maintenance engineers, and private pilots.

A complete list of the most popular American aviation engines is classified according to the knock rating of the fuel required, the knock rating being expressed in octane numbers. The listed engines may be operated without detonation, using the assigned fuels under full throttle conditions and a specific fuel consumption not greater than the manufacturers' guarantee.

The chart will be one of the features of the 1932 Stanavo Pilot's Handbook.

#### *Plycor Plywood Data Sheet*

A DATA sheet on Plycor Aircraft Plywood has been prepared by the Plycor Company, Chicago, Ill. This data sheet is the first of a series to be brought out at intervals as the occasion demands. Copies may be obtained by writing to the company, 1500 South Western Avenue, Chicago.

DESIGN

ANALYSES

RESEARCH

**DR. MICHAEL WATTER**

*Consulting Aeronautical Engineer*

220 West 42nd Street - New York City

## NEW AERONAUTICAL BOOKS

### UP SHIP

By LIEUT.-COMMANDER C. E. ROSENDAHL

**H**IGH adventure is mingled with serious discussion of airship fundamentals and predictions concerning the future of lighter-than-air craft by the captain of the *Akron*. An airship veteran of renown, the author bases his book upon his own experiences and study.

Three chapters of unusual interest describe the first trans-Atlantic flight of the *Graf Zeppelin*, its 'round-the-world trip, and the last voyage of the *Shenandoah*, in all of which the author participated. His narration and description are vivid and detailed, as he takes his readers with him on these flights and on cruises of the *Los Angeles*.

Part of the book is devoted to the past, telling of early trials and errors in building and operating American airships. In conclusion, Commander Rosendahl foretells the future of the airship, saying: "Cooperation, confidence, foresight and a little imagination on the part of capitalists, engineers, scientists and operators of present-day modes of transport will put the airship across."

### FLYING AND HOW TO DO IT

By ASSEN JORDANOFF

**W**ITH his pages filled with drawings, and the text serving only to explain and elaborate upon the pictures, the author uses a new idea in teaching flying principles. Whether used by the beginner, who wishes to learn flying facts step by step, or by the more advanced student, the book is helpful in leading to clearer and quicker understanding.

"Flying and How to Do It" introduces plenty of humor, which mingles unobtrusively with the serious instruction, adding interest to the book. Information is arranged in the order in which a flight

instructor would give it to a pupil in the course of flight training.

Joining the first aerial fighting squadron in history at the age of fifteen, the author won renown as a Bulgarian ace in the Balkan War of 1912-13. He has seen aviation from many angles, as a designer, builder, and pilot of pursuit and bombing planes in wartime and of air mail, passenger, and student planes in time of peace. In "Flying and How to Do It," he expresses himself simply and clearly in terms that any novice can understand. Conciseness is another feature, and the author seems to have accomplished his expressed purpose of presenting "a complete flying course in a nutshell."

### BARNARD ON LEARNING TO FLY

By CAPT. C. D. BARNARD

**S**IMPLE language and an extensive knowledge of his subject marks this book by an experienced and well known aviator. Captain Barnard does not waste time on discussing theoretical problems of but little use to the average flier. He does, however, go into the details of flying very thoroughly, and each step is illustrated with the greatest care by means of drawings.

The book is full of useful hints, such as: "Points to remember for forced landings," "a few golden rules that will spell immunity from accidents," "the spin—its causes and cures," and "cross-wind landings and take-offs."

In addition to actual instructions for flying, the book contains preliminary "ground work," such as full information on the parts of the airplane and what makes it fly. While it is especially useful for the beginner, "Barnard on Learning to Fly" contains many points that a more experienced pilot would do well to have in his possession.

**The kind of instruction you want . . . . .  
at the aviation center of the East**

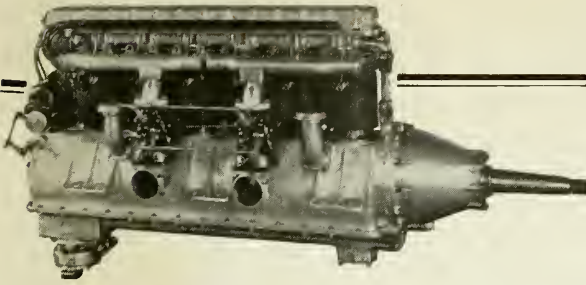
Roosevelt's flying and ground courses offer you just the kind of instruction you want for commercial or sportsman pilot; airplane and engine mechanics; airplane construction and repair; other special courses, including welding.

Practical experience in the hangars and shops of Roosevelt

Field, the World's Premier Airport; complete facilities and equipment; an expert staff of instructors; highest government rating. Moderate terms, conveniently payable. Accommodations for those from out of town.

Write for Booklet Y, and tell us in what branch of aviation you are interested.

**ROOSEVELT FIELD**  
AVIATION SCHOOL  
MINEOLA LONG ISLAND



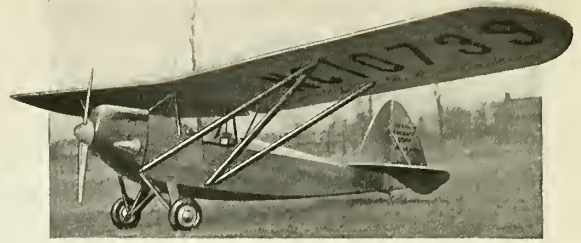
## Precision counts most in Airplane Engine Parts

**W**E design and build complete engines. Several of our experimental engines have been in the air now for over two years with no engine part failures.

*Good Workmanship is Economical*

### The Steel Products Engineering Co. Springfield, Ohio

Engine Parts	Propeller Blade	Propeller Balancing and Checking Equipment
Gears	Templates	
Propeller Hubs	Safety Filler Caps	Special Tools, etc.
Engine Stands		



## Wings for Everybody

. . . . the vibrant song of a motor overhead . . . . bright wings flashing against the sky and vanishing into the distance. . . . Does the sight leave you feeling "deserted"? Do you long to be in the pilot's seat? You can!

Flying, since the advent of the new Heath, has become everybody's privilege. For sport, business or training, the Heath is the neatest, most reliable and economical light airplane made. With perfect control, great visibility and low landing speed, the Heath is ideally suited to novice or student pilots. Its small cost of operation makes it popular with the private owner and profitable to the professional operator.

The new Heath can be had either in fly-away or in knock-down form, and, when assembled from the Heath K.D. kit, is eligible for a Department of Commerce license.

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# FOREIGN NEWS IN BRIEF

*Compiled from correspondents' reports and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.*

## AUSTRALIA

S. E. NELSON, general secretary of the New Zealand Aero Club, reports that every municipality in New Zealand with a population of more than 5,000 has its own airdrome or is making arrangements for one. Ten fully organized clubs, and a number of smaller ones, with a combined membership of more than 2,500 and about forty machines, are affiliated with the New Zealand Aero Club.

The New Zealand government has not curtailed the estimates of the Aviation Department, as the government considered that aviation is a matter of great importance and should be encouraged as much as its resources permit.

THE longest solo flight for a woman in Australia has been accomplished by Mrs. H. Bonney, who flew her Gypsy Moth from Brisbane to Wangaratta, a distance of 1,300 miles.

ONE of the largest private flying clubs in the world, the Aero Club of New South Wales, has published a report of its flying activities during 1931. The Club states that the number of hours spent in the air was 3,325, of which 2,343 were occupied in solo flights. The number of passengers carried was 5,385.

The club's fleet now comprises eight machines, consisting of five Moths, one Avro Avian, one Westland monoplane, and one Genairo, while two permanent instructors are employed.

The gliding section is becoming increasingly popular, and six pilots are waiting to be tested. There is a membership of forty-three and the number of flights made last year was 775.

## CANADA

AT THE end of February, 1932, the following Canadian certificates and licenses were in force: Private pilots, 288; commercial pilots, 379; air engineers, 338; registered aircraft, 361; licensed airports and seaplane bases, 80.

CANADIAN AIRWAYS, Ltd., will use Sea Island Airport, Vancouver, B.C., as a base for its fisheries patrol, photography, and general charter work.

A NEW building has been completed at Stevenson Airport, Winnipeg. It houses the customs office, waiting rooms, meteorological offices, radio room, post office and staff quarters, in addition to serving as a hangar for the Junkers JU-52.

CANADA's premier flying prize, the McKee trophy, was won for 1931 by George H. R. Phillips, superintendent of eastern flying operations for the Ontario Provincial Air Service, according to an announcement by Hon. D. M. Sutherland, Minister of National Defense. The trophy is awarded each year by a committee to the person who is judged to have done the most for flying in Canada for the year. Superintendent Phillips was awarded the trophy for his many hazardous flights in connection with forest fire suppression, his flights for the department of health, and because of his training of pilots at Sault Ste. Marie, the base of the Ontario Air Service for the work of flying the northern forests to scout and suppress forest fires. He flew 770 hours during the season, from May to October, when the provincial aerial firefighters are busiest.

## CHINA

A RECENT survey of aeronautic developments in China during 1931 reveals that three air services were operated. Amphibians were operated on the Yangtze from Shanghai to Hankow, later being extended to Chungking, by the China National Aviation Corporation. Another service, between Canton and Wuchow, was later discontinued. A Sino-German company inaugurated an air service between Shanghai, Nanking, Peiping, and Manchuli, which also was abandoned. Near the end of the year preliminary surveys were made in preparation for a new route from Peiping through Tihwa and Russia to Europe.

Limited manufacturing of aircraft was carried on. The Naval Aircraft factory, moved from Mamoi to Shanghai, rebuilt imported planes and constructed two convertible two-place biplanes which were equipped with 165-horsepower American radial air-cooled engines. Three two-place planes were built at Canton.

Only a few of the 140 airports were rated as first-class. New fields with improved facilities were being completed at Nanking and Canton. Most airports are in the eastern part of the country.

## DENMARK

THE greatest gain in air traffic since 1923 was shown in 1931 figures at Kastrup Airport, Denmark. Passengers increased from 8,569 in 1930 to 11,248 in 1931, with arrivals and departures of airplanes rising from 4,020 in 1930 to 5,451 in 1931. Freight carried in 1931 reached 518,263 pounds, as compared with 458,116 pounds in 1930.

## ENGLAND

A TOTAL of 1,510,867 miles flown and 30,581 passengers and 1,664,970 pounds of mails and freight carried is the record of Imperial Airways for 1931. Mileage flown increased twenty-four per cent over the previous year, and passengers showed a gain of thirty-one per cent. Air mail from England advanced twenty-nine per cent.

BRITISH single-seater fighting planes recently exceeded the world's speed record of 407½ miles per hour in vertical dives from 20,000- and 25,000-foot altitudes in which they reached a speed of about 410 miles per hour. Three types accomplishing this feat are the Hawker "Fury" and "Nimrod" of the Royal Air Force and the Fairey "Firefly," recently ordered for the Belgian Air Service. The speed was reported to have been reached without any disturbance or undue vibration.

THE flight of a Royal Air Force long-range monoplane from Cranwell, Lincolnshire, to Cape Town, South Africa, has been postponed until next November because of weather conditions.

THE Bristol Aeroplane Company is manufacturing a new series of engines called "Pegasus." The series contains five engines, each obtainable with two different gear ratios. The engines develop between 590 and 635 horsepower.

THE Westland Aircraft Works has produced a new all-metal biplane, the P.V. 6, based on the design of the "Wapiti." The plane is constructed with a racing plane's outlines as far as possible. It is powered with a "Pegasus" engine.

BRITISH government-subsidized light airplane clubs reported 71,474 flights in seventy-eight club planes during 1931, accounting for 28,686 hours of flying time. The total average membership of the twenty-three clubs reporting was 6,711, of which 3,484 were flying members and 3,227, associate members. During the year 380 members qualified for the amateur pilot's "A" license, and three, for the professional pilot's license, bringing the totals of these two divisions for club members to 1,573 and 108, respectively.

Two of the most recently formed British flying clubs are one organized from the messenger boys on the staff of a large cable company, with a membership of 200, and one restricted to the students at the De Havilland Technical School. The

latter have built their own plane from odd parts of a Moth light biplane and a Gipsy engine.

SEVERAL Puss Moth monoplanes at the De Havilland factory are to be added to the air force of Iraq, founded last year. The planes are to be used in desert patrol work and may be used for the transportation of wounded.

THE Bristol Aeroplane Company recently installed a low-temperature chamber for engine tests under Arctic conditions. A new device incorporated in the engine helps oil to circulate freely in a short time, even after remaining overnight in the chamber. The company has also developed the design and construction of magnesium propellers.

THE Avro 626 training biplane includes a resistance-reducing Townend ring around the 215-horsepower Lynx engine, low-pressure "doughnut" wheels, wheel brakes, and an extra fuel tank in the upper wing among the modifications installed after recent Air Ministry tests.

PROFESSIONAL and amateur British pilots will compete in races for the King's Cup at an airdrome near London early in July. The first day's racing, over a 750-mile course, will eliminate all but fifty competitors, who will race 500 miles on the second day. Only pilots who have soloed at least 100 hours will be allowed to enter the races. Any type of civil aircraft is eligible.

## FRANCE

THE French Five-Year National Aviation Equipment Program, passed by the Chamber of Deputies, provides for the expenditure of 177,000,000 francs. A sum of 64,000,000 francs of this amount will go toward work on laboratories, centers of experiment, for instruction, equipment and workshops owned by the Government. A total of 75,000,000 francs will be devoted to airports, and 38,000,000 for the building of trans-oceanic seaplanes.

THE beginning of 1932 found 1,383 civil airplanes registered in France, according to semi-official figures. Of this total almost seventy per cent were owned by forty air transport companies, while 346 planes belonged to individuals and the remainder to flying clubs.

PREPARATIONS are under way for the opening of a Franco-Belgian trans-African air service. Work has been started on landing fields, meteorological stations and hangars.

REPORTED to be the first towing of its class in France, a glider was towed

over Paris recently by airplane. A special towing device, consisting of a long aluminum rod hinged to the top of the plane by a universal-type joint, carried the point of attachment of the cable above the tail surfaces, preventing contact with them. Deflections were limited by a telescopic prop. A sling controlled by the airplane pilot comprised the hooking system at the end of the rod. The plane was equipped with a 130-horsepower rotary Clerget engine, and the glider in the experiment was a German Kassel.

## ITALY

THE Aviation Budget for Italy, which has been deposited in the hands of the President of the House of Commons, includes an ordinary and extraordinary part. In the ordinary part are: General expenses, L.29,295,000; life annuity debt, L.2,180,000; military aviation, L.565,490,000; civil aviation, air traffic and meteorologic service, L.73,000,000. In the extraordinary part are: General expenses, L.3,635,000; military aviation, L.79,700,000.

A SAVOIA-MARCHETTI S-71 plane belonging to the Societa Aerea Mediterranea, serving on the Rome-Tirana line, has covered the 800-kilometer course without landing, in the record time of 191 minutes.

FOR 1931, the Rome-Tripoli airline, operated by Societa Anonima Navigazione Aerea, reported an increase, compared to 1930, of 300% in passengers and of 200% in express, mail, and luggage.

MISS GABRIELLA ANGELINI has secured a license for blind flying at Milan. She is the first woman in Italy who has secured such a license.

ITALY has announced plans to participate with five other nations in the European Tour of 1932, which will take place on a 7,500-kilometer course. The tour will be divided into three legs of 2,500 kilometers each and will begin and end at the Tempelhof Airport, Berlin, Germany.

## GERMANY

FURTHER details recently announced regarding the 1932 program of the *Graf Zeppelin* include a schedule of ten round trips between Friedrichshafen, Germany, and Pernambuco, Brazil. An appropriation of 400,000 marks has been sought from the government to cover a possible deficit on the South American journeys. The trips are scheduled for the middle of March to the middle of May and from August 27 to the end of November. Between May and August shorter European tours are planned, with a possible Arctic trip.

THE Hamburg Airport has reported an increase of twenty per cent in the volume of freight handled during 1931 over the previous year's total. The quantity of mail and newspapers showed a gain of 6.5 per cent, and total pay loads, not including passengers, an increase of 9.25 per cent. Foreign planes landing regularly at Hamburg rose forty-five per cent.

THE Focke-Wulf Flugzeugbau A.G. of Bremen, having taken the license of the English Cierva Autogiro Company, is constructing an autogiro of the C-19 type. The plane has three-bladed folding rotor blades, actuated by a self-starter. Within thirty seconds, it is reported, the blades may be set in motion by the engine, and when the required number of revolutions is reached, the starter is automatically released.

## MEXICO

APPLICATIONS for four long-distance and local aviation services are in prospect for Mexico. They have been filed with the aviation department of the Ministry of Communications and Public Works. Luis Rivera, Mexican capitalist, has applied for permission to conduct an air express service for the transportation of shellfish from Soto La Marina, Tamaulipas, to Brownsville, Texas.

The Compania Aerea de Vias Central, S.A., has sought permission to establish a daily passenger, mail, and express service between Mexico City and Ciudad



The *Aikoku* (*Patriot*), a Junkers K-37 all-metal bomber, presented to the Japanese army through public contributions of the people of Japan

Juarez, Chihuahua, across the border from El Paso, Texas, with stops at Leon, Torreon, and Chihuahua City, and a similar service between Torreon and the west coast port of Mazatlan.

Other concessions solicited were by Octavio Vejar Vazquez, Mexican lawyer, for a local service between Tijuana and Ensenada, Lower California, just below the United States border, and by Agustin Ortiz, for a regular passenger, mail, and express service between Mexico City and Morelia, capital of Michoacan, with stops at Huetamo, Tacambara, Ario, Zacapu and Zaragoza.

AIRPLANE passenger, mail, and express service between Mexico City and Nuevo Laredo has been established by Transportes Aereos Mexico-Cuba company. The company plans to extend the air service later from Nuevo Laredo to San Antonio. Fleetster cabin monoplanes, propelled by 525-horsepower Hornet engines and each having accommodations for six passengers and a pilot, besides compartments for mail and express, are used in the service.

FEBRUARY movements by Mexican companies include the following: Mexico City-Tampico-Brownsville, Tex., route of Mexican Aviation Company, Pan American Airways subsidiary: Passengers, 304; mail, 2,344 kilograms, and 42,630 kilometers flown; Mexico City-El Paso, Tex., service of Corporacion Aeronautica de Transportes: Passengers, 31; mail, 214 kilograms, and 20,943 kilometers flown; extra flights: Passenger, 119.

The Ministry's figures for the last half of 1931 are: Passengers, 11,703; mail, 29,257 kilograms; express, 119,668 kilograms; baggage, 103,781 kilograms; 1,546,414 kilometers flown.

THIRTY-FIVE charts, giving complete data concerning all Mexican airways, are being prepared by the aviation department of the Ministry of Communications and Public Works. Regular stop towns and distances between them, air strata, heights of mountains, etc., are clearly defined. The charts are intended to amplify fliers' knowledge of terrain over which they travel.

LANDING field construction financed by state and municipal governments is being pushed in various parts of Mexico. A field has been inaugurated at Tuxtla Gutierrez, capital of Chiapas, and on the Vera Cruz-Guatemala route of the Mexican Aviation Company. Two fields are being conditioned in Michoacan, one at Patzcuaro and the other at Ario de Rosales. Work has been started on a field at El Mante, Tamaulipas, and another at Izamal, near Merida, capital of Yucatan.

THREE Spartan practice planes, each powered by 120-horsepower engines, have been acquired by the Chihuahua state government for training purposes at the civil aviation school it is conducting in Chihuahua City, the state capital. The school, which has twenty students, was founded by Colonel Roberto Fierro, Chihuahua state governor and Mexican army flying ace who made a record non-stop flight from New York to Mexico City last year. The institution is under the jurisdiction of the Federal Ministry of Communications and Public Works.

### NORWAY

INCREASED operation of air services in Norway was proposed in a recent report by a committee appointed by the

Ministry of Defense to investigate the advisability of such action. Only one air service, air mail, has been operated in Norway.

The establishment of two domestic airlines, between Trondheim and Tromso and between Trondheim and Stavanger, and the inauguration of two international services were suggested in the report. The latter lines would be a night and day service between Oslo, Gothenburg, and Copenhagen, and an airline between Oslo and Amsterdam.

The report favored private operation and advised against operation of air services by the army or navy, although encouraging cooperation. It indicated that a merger of companies into one strong organization would be preferable, if government aid is given to private interests.

### SOUTH AMERICA

FOREIGN companies operating aircraft over Argentine territory are allowed to carry merchandise and passengers within the limits of the country when not in competition with Argentine aircraft. The foreign operators are required to keep a list of all passengers, their nationality and profession, as well as manifests of merchandise carried.

ONLY non-negotiable bills of lading instead of consular invoices are now required for packages sent by air in Colombia. Bills of lading with the notation, "packages carried by air express," must be presented at the first airport where the aircraft lands. Receipts carried are required to be signed under oath by the forwarders and to be certified as to contents, origin, and value of merchandise by an agent of the air transportation company.

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# A new Model Department begins in this issue

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**A**ERO DIGEST has purchased NATIONAL GLIDER AND AIRPLANE NEWS. We discontinued it as a separate magazine, combining its subscription circulation with that of AERO DIGEST.

The Model Department makes its first appearance in the current issue. It is an enlargement of our former Experimental section and offers something new in the line of model aircraft literature.

The addition of this Department in no way affects the editorial content or size of AERO DIGEST. It is added material. The increase in circulation by over six thousand subscriptions entails no change in advertising rates.

Edited by Raymond E. Dowd, aeronautical engineer and prominent model aircraft authority, AERO DIGEST's new Department is an elementary course in aerodynamics. Everyone will find it educational.

---

*"Remember, the aircraft executive of today was a model builder a few years ago.  
The executive of the future is the model builder today.  
Cultivate this market now."*

●



## WALL JUNIOR ENGINE

R. E. DOWD

**T**HERE has been so much interest shown in the Chupp "Little Bitty" engine, which we described in these pages in the April, 1930, issue, that we have been on the lookout for additional subjects of this nature. Many of our readers were disappointed that parts and castings were not available for the Chupp engine, but this month we have a different story to tell.

From the laboratories of Elmer A. Wall of 5900 North Fairfield Avenue, Chicago, we bring our readers a most unusual story of model gas engines of all types and sizes. As we glanced around the laboratories we saw air-cooled and water-cooled single-cylinder and two-cylinder, vertical and horizontal, two-cycle and four-cycle types. Every nook contained something of absorbing interest. When running they buzzed like

busy bees, and with the muffler cut out they suddenly burst forth with an ear-splitting roar and sent blue flame and exhaust gases belching from their ports.

With this marvelous array of internal combustion engines we are at a loss to know why Mr. Wall's achievements have not found their place in our pages heretofore. We can only make apologies to our readers and get under way with our description of the Wall Junior engine, which can be made in any well equipped workshop from Wall finished parts, castings, and full-size drawings.

### General Classification

Particularly for the benefit of our new readers we should explain the general

classification of the Wall Junior engine. We can sum it all up by saying it is a one-cylinder, two-cycle, four-port, air-cooled engine, with a  $1\frac{1}{4}$ -inch bore and a  $1\frac{1}{4}$ -inch stroke, and it has a piston displacement of 1.53 cubic inches. It will be recalled that the so-called two-cycle principle of operation calls for an explosion at every revolution of the crankshaft. This means, of course, that the incoming explosive mixture enters the cylinder while the exhaust gases are being expelled. To avoid intermixing of the two gases the top surface of the piston is designed to deflect the incoming gases upward toward the cylinder head as they enter from the crankcase by way of the transfer port.

There is not space here, unfortunately, for a complete, detailed description of this most remarkable power plant, so we must be content with a brief description of the various parts.

### Crankcase

The Wall Junior crankcase is cast in two pieces of aluminum. A male and female fit is used for perfect alignment. Suitable brackets are cast on either side for mounting. These are drilled with four  $3/16$ -inch holes,  $1\frac{3}{14}$  inches on centers fore and aft and  $3\frac{3}{8}$  inches laterally. The upper portion of the case is drilled and tapped for the four 5-40 screws, which hold the cylinder in position. Bronze bushings with thrust flanges are provided for the crankshaft. These are reamed to a diameter of  $7/16$  inch and are of liberal proportions.

### Crankshaft

The crankshaft is cast steel and is furnished with cast-on extensions to facilitate machining by providing the eccentric centers. Brass counterbalance weights are attached with four 5-40 machine screws. The crankshaft terminates in a No. 1 Morse taper. Oil retention grooves are machined near the ends of the journal.

### Connecting Rod

Bearing bronze is used for the connecting rod rather than an attempt to bush

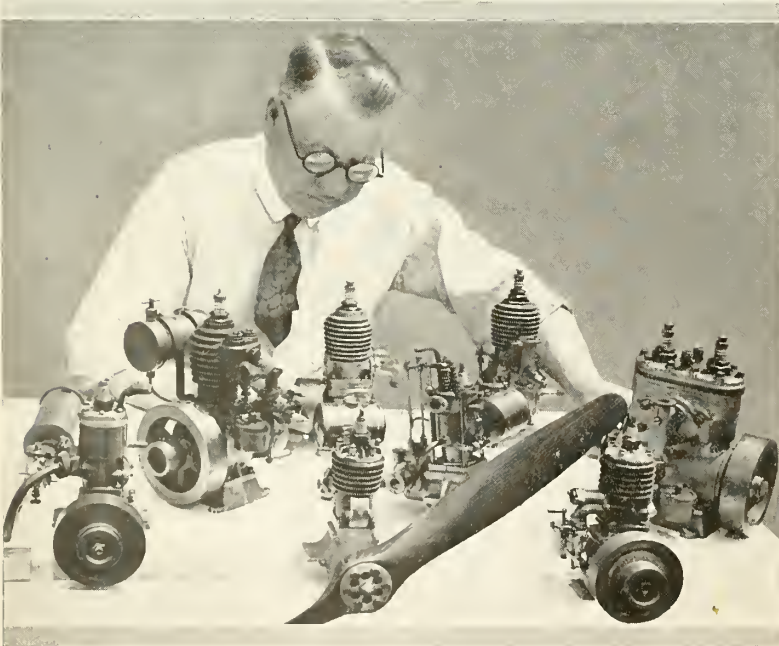


Photo courtesy of Popular Mechanics

Mr. Wall and some of his engines; the one with propeller is the Wall Junior

a steel rod. The whole unit is cast integral, and after machining it is split for installation on the crankshaft. Two 5-40 screws serve to unite the split bearing at the crankshaft. Small lubrication holes are provided to convey the oil vapor to the bearings on both ends of the rod.

**Piston and Wrist Pin**

Lynite serves as the material for the piston. It has a carefully designed baffle to minimize loss of efficiency. Two rings of cast iron are used, both above the port. The skirt is split to take care of expansion.

The wrist pin is tubular and of tool steel, 1/4-inch diameter. Small brass plugs are inserted in either end to prevent scoring the cylinder wall.

**Cylinder and Head**

The diminutive cylinder is of cast iron. The cooling fins are six in number and are not machined. The manifold and transfer ports are cast in the form of four rectangular indentations which break through as the cylinder is bored. These need only cleaning up with a file to be finished. These four ports function as two, the bridge piece being to preserve the bearing surface for the piston rings.

The transfer ports serve to convey the incoming gas from the crankcase to the combustion chamber. The transfer port cover, which attaches over these ports, completes the channel for conducting the gas. The transfer port cover is an aluminum casting attached by two screws.

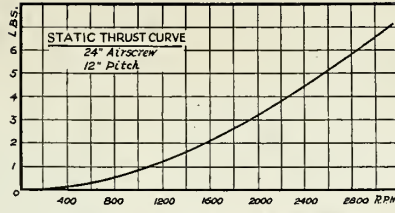
The head is also an aluminum casting. Six 5-40 screws serve to secure it to the cylinder. Radial fins are cast to assist in cooling as well as to reinforce the construction. It is tapped for the 12-millimeter Bosch spark plug.

**Carburetor and Manifolds**

Mr. Wall's extensive experience with both large and small gas engines, covering a period of forty years, has been drawn upon in designing the special multi-jet horizontal type carburetor used with the Junior engine. The weight of the complete unit is but 2 1/2 ounces. It is complete in every detail—cork float, needle valve, adjusting screws for idling and air blending—in fact, it is a perfect miniature of a large carburetor. Both intake and exhaust manifolds are cast integral of aluminum. This construction makes use of the "hot spot" to improve efficiency by heating the intake gas.

**Ignition**

A standard Delco-Remy breaker arm is used to open and close the circuit. It is built into a lever assembly at the rear of the engine and is actuated by a cam on the crankshaft. Advancing and retarding the spark is accomplished by simply moving the lever assembly. A special small-size coil and flashlight batteries are used for aircraft work where weight reduction is essential.



Performance curve of Wall propeller

**Lubrication**

The lubrication of the engine is taken care of by using a 15:1 solution of gas and oil in the gas tank. This method has the advantage of light weight and simplicity and has given no trouble in service.

**Propeller**

The selection of a propeller for use with a model gasoline engine is somewhat more difficult than for a rubber strand engine. In the case of the latter, we have a certain number of revolutions, and consequently a certain number of foot-pounds of energy stored in the engine, and the problem centers around designing a propeller which will conserve the revolutions in order to extend the duration of flight.

With the gasoline engine, we are no longer concerned with conserving revolutions. We are instead concerned with the power curve of the engine showing the available horsepower at various r.p.m. The propeller is then designed to utilize a certain amount of this power, basing the selection on the requirements of the particular model in question.

The static thrust for various r.p.m. of

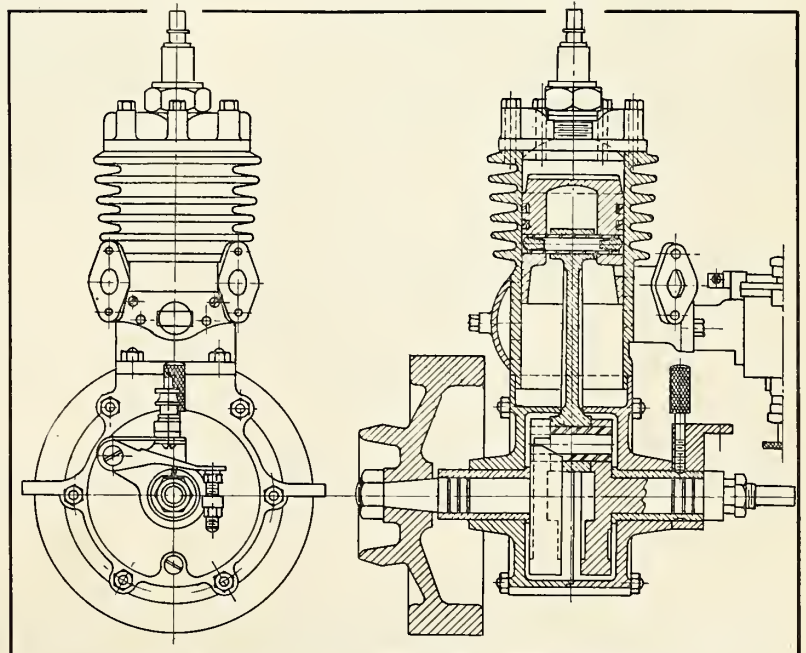
the propeller is shown in the diagram. This propeller was carved from a solid block. The blade form was symmetrical, and the maximum width was slightly over two inches. Perhaps the performance indicated could be improved by using a propeller of other characteristics. This is part of the model designer's problem.

**Performance**

The engine weighs complete about two pounds without flywheel. The additional equipment, such as propeller, which takes the place of the flywheel; gas tank, ignition coil, and batteries, adds approximately 1 1/2 pounds to this weight. A total of 3 1/2 pounds represents the entire power plant weight.

The accompanying static thrust curve was taken with one of the first engines of this design. The present Wall Junior engine delivers considerably more power than this and is amply light for aircraft purposes. In the near future we hope to have complete drawings and descriptions of a model plane which has already flown successfully with the Wall Junior as a power plant.

The design and development of a miniature engine such as the Wall Junior represents hundreds of hours of specialized effort. Model builders who have contemplated the construction of a gas engine model plane, but who have been "stumped" because of the expense of elaborate patterns and the uncertainties of developing a new power plant, can now revive their projects with the assurance that the Wall Junior engine is a tried and proved engine of real merit.



End and sectional views of the Wall Junior gasoline engine

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**Colonel Lindbergh's Lockheed-Sirius Seaplane**  
Wing Span, 16"

Contents: Full size blueprints, with complete instructions, cut-out fuselage with drilled cockpits, cut-out wing, elevators, rudder, floats, 3 colored pigments, finished cast aluminum propeller, aluminum cowling, printed sticker insignia and numbers, aluminum windshield frames and water rudder, strips, cement and other necessary materials.

**Curtiss-Wright Junior**  
Wing Span, 16"

Contents: Full size blueprints, with complete instructions, cut-out fuselage, with drilled cockpits, cut-out wing halves, rudder, fin, elevator, 3 colored pigments, and aluminum propeller, cast aluminum motor, rubber tire doughnut airwheels, printed sticker insignia and wing numbers, aluminum windshield, cement, strips, and other necessary materials.

*These models are true scale replicas of the original ships, and were designed by Otto A. Koller, aeronautical engineer.*

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**PAPER AERODYNAMICS**

**THE ROLY-POLY GLIDER**

**A**S the first subject to appear in our new "Paper Aerodynamics" section, which is to be a part of our "Experimental" department, we have a most unusual glider.

Perhaps we are taking unwarranted liberties with our nomenclature by calling this curious creation a glider, for it rotates rapidly as it descends on a sloping flight path. But, after all, we speak of autogiros "gliding in" and under such conditions the rotor blades are sustaining by far the greater part of the total weight. As the Roly-Poly glider descends, the rotating sustaining surface furnishes all the available support, so the comparison is, perhaps, not too far-fetched. To be sure, the rotational axis is vertical in one case and horizontal in the other, but basically speaking they have much in common.

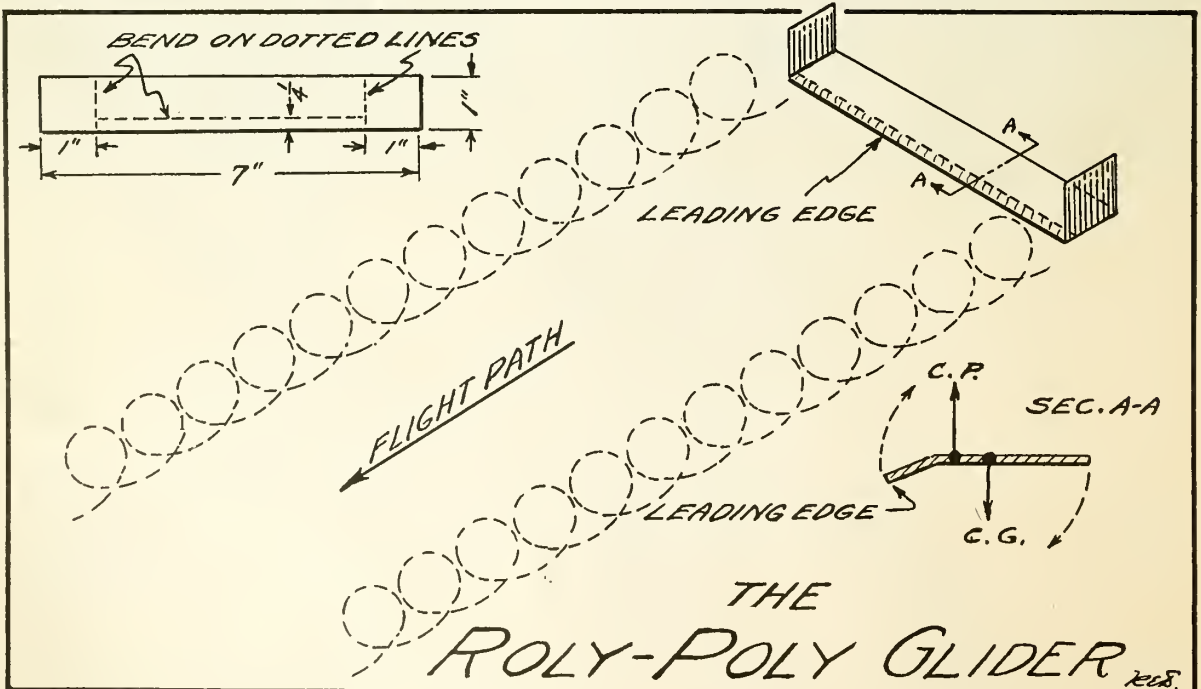
The Roly-Poly glider is the utmost in simplicity. All that is required to make it is a strip of paper, not cardboard; ordinary business stationery is excellent. A convenient size is seven inches long and one inch wide. As shown in the sketch, both ends are bent up on

a line one inch from either end. After this is done, a sharp crease is made along one edge. (See section A-A.)

Now we are ready to demonstrate a most peculiar phenomenon. We might call it "auto-rotation," which has been used to describe the basic principle of the autogiro, but this time it occurs in the horizontal plane. If we launch the model with the leading edge forward as though it were to make a normal glide, it will give us a surprise by spinning in a most ambitious manner, and at the same time it will descend gently in a sloping path. The sinking speed will be only one to 1 1/2 feet per second, which compares favorably with regular gliders of like size and wing loading. While its sinking speed is only moderate, its forward speed is extremely low. These two factors of performance intrigue one into thinking of the possible application of the principle to a distinctly new type of aircraft capable of making slow speed and at the same time steep landings.

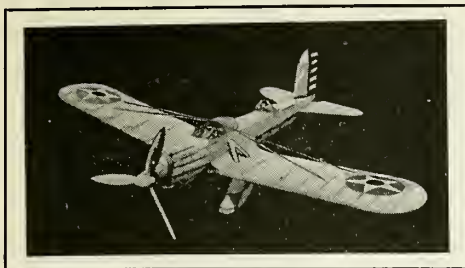
It is easily possible to steer these Roly-Poly models. Several methods are

*(Continued on following page)*



**THE ROLY-POLY GLIDER** *2028*

# NEW ATTRACTIVE SENSATION OF THE AIR !

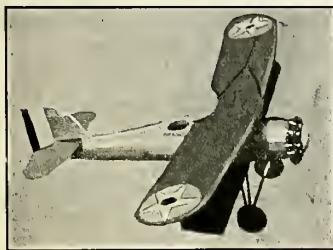


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(Continued from preceding page)

effective, such as warping the horizontal surface, as in the early types of planes, or creating an added drag on one tip by distorting the fin surface. However, the most sensitive control seems to be caused by changing the fin angle with the horizontal portion of the model. If one fin angle is made obtuse instead of ninety degrees, more lift seems generated on that side, causing the model to turn in the opposite direction. When this control is applied to excess, the model will slide off on the wing tip toward the inside of the circle.

We have purposely delayed our explanation of this unusual phenomenon so as to increase the curiosity of the reader, but now that we have our models "Roly-Polying" around the hangar or club room we should get down to the underlying principle.

Section A-A is cross-section taken through the wing. Because the model is unballasted the center of gravity (C.G.) is located midway between the leading and trailing edges. At small angles of attack the center of pressure (C.P.) will be located about one-third back from the leading edge. This condition immediately introduces a couple as shown, causing the leading edge to rise higher and consequently the angle of attack increases. Being a curved surface, the C.P. moves forward with the increased angle of attack, thereby augmenting the original condition. The inertia of the model continues this motion through a complete cycle, when it takes place all over again. The result is a rapid sequence of infinitely short glides stalls and loops.

It is interesting to check the sinking speeds of a Roly-Poly glider made of double thickness paper throughout, and a glider of the same size, which uses the extra thickness of paper for ballast by folding into a narrow strip at the leading edge. Of course, in the actual glider the trailing edge is bent up to provide longitudinal stability. If these two models, which have equal weight and area, are dropped simultaneously from a given height, they will have about the same sinking speed, but the actual glider will travel horizontally a much greater distance than the Roly-Poly type.

This characteristic brings us to a very practical use of Roly-Poly paper gliders, for knowing their sinking speeds we can launch a handful at a time at a point where we wish to check the presence of rising currents, such as over soaring terrain. Since they do not cover much horizontal distance, they will float for long periods in plain sight, free from disturbing gusts which make the conventional glider flight path irregular. Having a uniform sinking speed, the Roly-Poly gliders make it easy to calculate from observation the approximate velocity of rising air currents.

# MODELS

## THE LAWRENCE FLEDGELING

IT is indeed a pleasure to present to readers of our new "Models" department this fine all-balsa R. O. G. tractor monoplane. Even a casual observer will not fail to appreciate its clean-cut, well proportioned, and well thought out design. Years of experience are built into this 18-inch beauty.

For this latest discovery we are indebted to George L. Lawrence, a veteran model builder, of Chicago, Illinois. His model experience dates back to the days of Lincoln Beachy. In addition to his research activities, Mr. Lawrence places his more successful designs at the disposal of model builders in the form of construction kits. This will be good news to our many readers who have written for information about construction kits for models described in our pages from time to time. For Fledgeling construction kit information, write directly to Lawrence Airplane Models, 1319 Hood Avenue, Chicago, Ill., as AERO DIGEST does not supply them.

Perhaps the outstanding feature of the Fledgeling is its extreme simplicity. This makes it an ideal model for beginners, and yet without doubt more experienced builders will find many points in its design worthy of careful consideration. From a standpoint of performance it is just as remarkable as it is simple in design. In fact, it takes a very fine built-up model of like size to equal it in distance or duration. This is probably due, to a great extent, to the clever adjustable tail

unit, which attaches to the fuselage stick by a wire fitting.

Well, so much for the model. Let's see what we need to build it.

### Balsa Wood Parts

Fuselage stick	.....	$\frac{1}{8} \times \frac{1}{4} \times 12$
Tail boom	.....	$\frac{1}{8} \times \frac{1}{8} \times 4$
Stabilizer and fin	.....	$1/32 \times 2 \times 11$
Landing gear struts (2)	.....	$1/16 \times 3/16 \times 8$
Landing gear axle	.....	$1/16 \times 3/16 \times 5$
Propeller blank	.....	$\frac{1}{2} \times 1 \times 7$
Wings (2)	.....	$3/32 \times 2 \times 9$
Wing incidence block	.....	$\frac{3}{4} \times 7/16 \times 2$

### Music Wire Parts

Propeller shaft	.....	.030 $\times$ 2 $\frac{1}{2}$
Tail fitting	.....	.030 $\times$ 2
Tail skid	.....	.016 $\times$ 1 $\frac{1}{4}$

### Miscellaneous

Cement	.....	tube
Rubber motive power	.....	$1/32 \times \frac{1}{8} \times 42$
Dural propeller bearing	.....	$1/32 \times \frac{1}{8} \times \frac{1}{2}$
Brass washers (6)	.....	$\frac{1}{8}$ O.D. $\times$ $1/32$ hole
Brads for axles (2)	.....	.034 $\times$ $\frac{3}{4}$
Celluloid wheels (2)	.....	1 inch diameter
Rubber band for holding main plane to stick		

After we have collected our complete bill of material as listed above (either from our workshop stock or through the purchase of a complete kit), we are ready to proceed with the construction. The following list gives the correct dimensions for each letter found on the drawing:

### Table of Dimensions (Inches & Fractions)

A	.....	18	J	.....	$\frac{3}{4}$	S	.....	$3/64$
B	.....	2	K	.....	4	T	.....	$\frac{1}{4}$
C	.....	$1\frac{1}{2}$	L	.....	12	U	.....	4
D	.....	$4\frac{1}{2}$	M	.....	$\frac{1}{8}$	V	.....	$2\frac{1}{4}$
E	.....	1	N	.....	6	W	.....	$3-5/16$
F	.....	$1/16$	O	.....	$\frac{3}{4}$	X	.....	$3-15/16$
G	.....	$1/32$	P	.....	$\frac{1}{4}$	Y	.....	1
H	.....	1	Q	.....	$3/16$	Z	.....	7
I	.....	7	R	.....	$3/16$			



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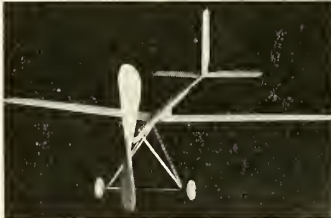
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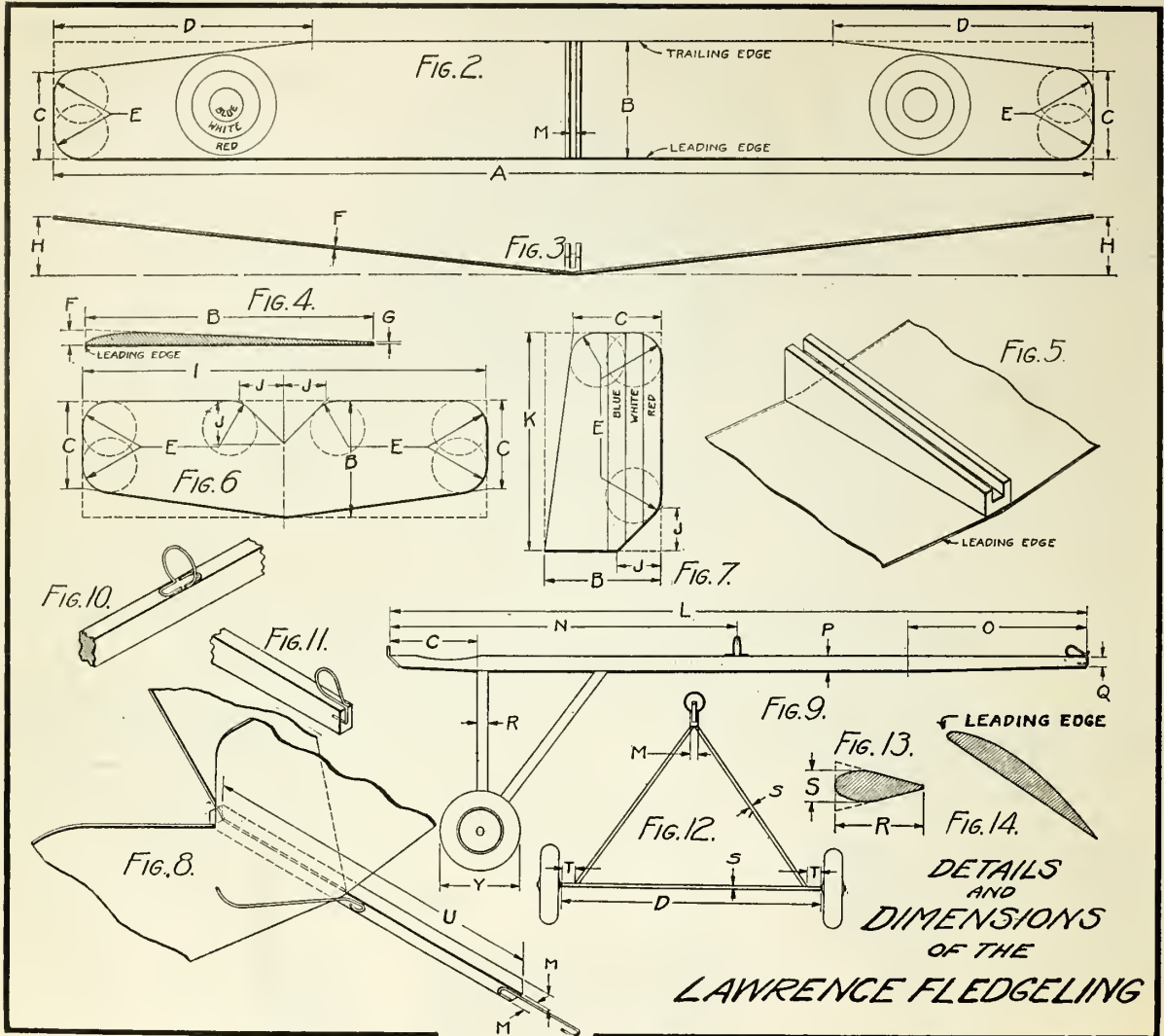
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(Continued from preceding page)  
**Fuselage and Landing Gear**

Let's start with the fuselage because so many parts attach to it that it will save us time if we can have them drying into an assembly as we work on the other parts later. The main stick is carefully cut as indicated in figure 9, using the dimensions listed. The landing gear sticks are then cut to length and sanded to a nice streamline section as shown in figure 13. The ends are cut at the correct angles to provide good joints. The wheels are assembled last, using a washer cemented to either side of the hub and a brad for the axle.

The fairlead or "can" as shown in figure 10 is really not necessary in the 18-inch size Fledgeling, provided the fuselage stick is of a high-grade balsa. If it is desired to add this part because of a tendency of the fuselage to bend, the details are clearly shown.

The final points of the fuselage assem-

bly are the propeller bearing, which is cemented securely in place at the nose, and the rear anchor hook, which is cemented to the opposite end. See figure 11.

**Tail Group**

Complete details of the tail construction are shown in figures 6, 7, and 8. It will be noted that the stabilizer is made of a single piece of balsa cemented to the bottom of the tail boom, while the fin is cemented to one side of the boom. Sharp scissors will be found very effective in cutting out thin balsa parts. The tail skid and the connecting wire fitting are shown in figure 8. The connecting fitting, which enables accurate and convenient adjustments to be made with the tail, is an outstanding feature of this model. It also gives the advantage of a lightened tail construction which permits the C. G. of the entire model to be further forward. This means the wing location is farther forward and the appear-

ance of the model is thus improved. Incidentally the total weight is reduced, which reduces the wing loading.

**Main Plane**

Full details of the wing construction are given in figures 2, 3, 4, and 5. The ingenious mounting block serves to unite the two halves of the main plane and also to provide the correct incidence for the wing section. A rubber band will serve to hold the wing in position on the fuselage at the correct location for best performance.

**Propeller**

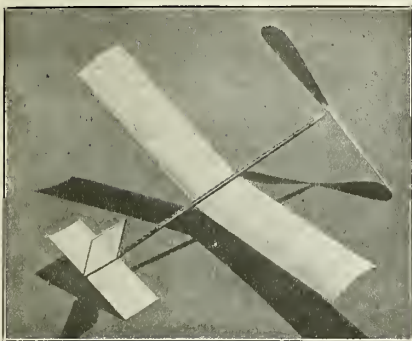
Mr. Lawrence has done much research with model propellers and attributes the success of his models, to a large extent, to their propellers. The Fledgeling uses a seven-inch diameter and a pitch of 8.4 inches. It is carved quite thin towards the tips, but the hub portions are left fairly thick for strength. It should, of

(Continued on following page)



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(Continued from preceding page)  
course, balance accurately to avoid vibration.

#### Flying the Model

After all parts are assembled and aligned correctly we are ready for our first trial flight. The wing should be located so that the C. G. of the whole model is about half way from the leading edge. The rubber should be wound about 150 turns for the trial flight. Choosing either a large indoor location, such as a gymnasium, or calm outdoor weather, the model should be placed on the ground and released for a take-off. If it climbs too steeply and stalls, the wing should be moved back slightly. If it fails to take off, the wing should be moved forward. The correct tail adjustment can be found only by experiment. For an initial setting it is a pretty good rule to sight down the under side of the main plane and then adjust the stabilizer angle so that the upper surface can just be seen. Further adjustments can be made if the stability is not uniform throughout the flight. Any tendency to dive after the power is exhausted should be corrected by bending the tail fitting down slightly, and if necessary to restore good climb, the main plane should be moved forward slightly. Pliers should be used on the wire fitting to make adjustments, or there is danger of breaking the balsa.

When finally adjusted, the model should take off quickly, climb steeply, level out at a good altitude without stall, and after the power cuts out, the glide should be gradual and the stability at all times perfect. The Fledgeling can do it, so don't be content until you have mastered your little plane from take-off to landing. That's part of the fun and you'll get a big "kick" out of your Fledgeling if you really study its peculiarities and master them.

## READER CONTACTS

HERE we are with our brand new department. We have had many fine letters from our readers, which we wanted to publish, but space would not permit. Probably we never will have enough space, but at least we have some for a start, so let's have more correspondence. Tell us what kind of subjects you like best. This is your department, so Let's Go!

#### "Cape Codder" Glider Soars Out of Sight

Cliff Abt says, "Enclosed find a signed statement describing the eventful flight of a *Cape Codder* soarer, constructed by myself from your plans, published in the October, 1930, issue of *AERO DIGEST*," and he continues: "I wish to be advised if this flight has approached any record for model gliders." Statement follows:

"This is to certify that a balsa *Cape Codder* soarer of 30-inch wing spread, constructed by Clifford F. Abt, residing at 451 Academy St., Astoria, L. I., N. Y., was launched in a field adjacent to 13 Woodland Drive, Hempstead, L. I., N. Y., at 12:37 P. M. on Saturday, October 3, 1931. After launching, it stalled at about 25 feet, tail-flipped, and immediately began to circle upward, rising steadily until it was last sighted at 1:08 P. M. directly overhead. Just before it was lost sight of, a flock of birds circled about with it, at which time the soarer could be distinguished by the sunlight reflected from the polished wing. The

soarer remained aloft 31 (thirty-one) minutes until it was lost sight of."

Witnesses: (Signed) John Domin, Jacob Domin, Joseph Domin, William Rehberg, Albert Rehberg, Anthony Domin, Olaf Knutsen, George Ognan, all of Woodland Drive, Hempstead, L. I.

How's that for flying, boys—up with the birds and then out of sight entirely? If by any chance it was ever found by a reader, Cliff would be tickled to hear about it. The insignia was a winged A with the designation "G. D.-1." Keep up the good work, Cliff, and all you other fellows who signed the statement. I envy you all seeing a flight like that.

#### A Reader Asks Some Questions

A reader of Junior Activities in *AERO DIGEST*, Charles Miller, writes:

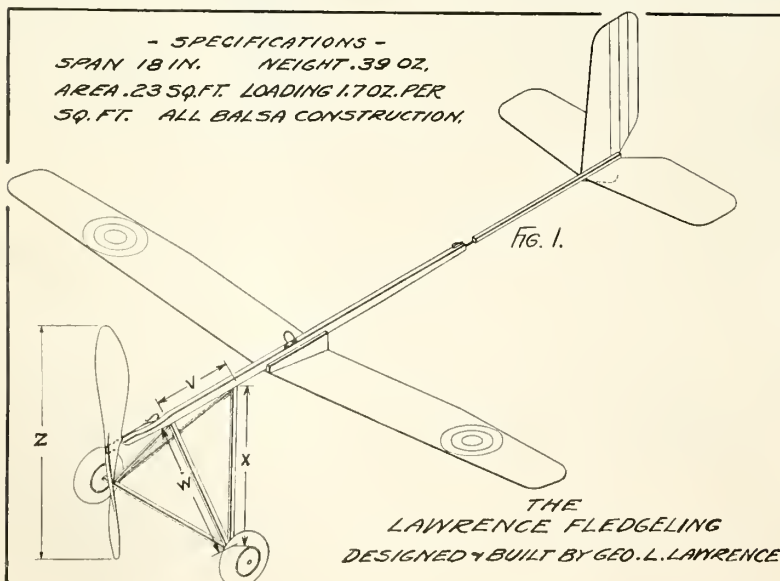
"I am coming to you for advice on the construction of a model plane, from which I could be reasonably sure to get good results especially as to its weight-carrying ability, and also to get a check on some characteristics of model planes which are not made for endurance, but for good dependable performance.

"First, would it be safe in assuming that 4.5 ounces per square foot is a conservative loading for a wing and what wing curve would you recommend for this loading?" Answer.—A loading of 4.5 ounces is easily possible, but not, perhaps, ideal for the type of model you describe. A good dependable model can be made with a loading of from three to four ounces in the average sizes used with rubber propulsion. An excellent curve for such a model would be the U. S. A. 5.

"Can you give me the weight of one cubic foot of balsa wood?" Answer.—From seven to ten pounds per cubic foot. It all depends on the quality. An average for a good grade should be about 8½ pounds.

"Upon what factors does the diameter and pitch of a propeller depend? Could you give me a formula for determining these figures?" Answer.—The diameter is usually taken in terms of span for a single propeller design. Practice would make the diameter from .4 to .5 of the wing span. The largest ratio I have experienced, however, was 1.25 times the wing span—and the model flew well! After the diameter is settled, the pitch is usually made from 1.25 to 1.50 times the diameter.

Sorry, Charles, we haven't space for further questions this time.





### Howard Racer

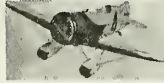
This 3/4" Cleveland-Designed Kit of Ben Howard's Racer met with such an overwhelming demand that we are offering it at this low price indefinitely. Span, 12"; length, 13 1/2"; weight, 1.3 oz. Colored with Cleveland's new White Kit dope. Complete Kit: SF-18 postfree, only **\$1**

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### GUYED TO COMPANY ORGANIZATION

(Continued from page 35)

Dig right in organizing. Let efficiency and deficiency be your watchwords. Take one complete herd of vice presidents—there are any number left over from 1929—and see what, if anything, you can do with them after you have equipped each one with a desk with nothing on it and a secretary in about the same condition. Each vice president is in charge of a department: Public Relations, Advertising, Engineering, Personnel, Supply, Plumbing, Heating, Insect Exterminating, and so forth and so on, until you run out of names. The larger the company, the more departments and the more v.p.'s—allowing we head into another boom.

The first department to organize is Public Relations, complete with its sub-departments, such as: Hand-Shaking Dept., Hotel Room, Miniature Bar and Free Lunch Dept., Back-Slapping Dept., Optimistic Stock Market Research Dept., Unconfirmed Rumors About Impending Army Business Dept., Optimistic Performance Data Dept., and the Pictures of Executives and Famous Visitors Dept. This last should be housed in a room tastefully decorated to appeal to visiting lady pilots and their backers. As your business grows in scope, volume, and yearly net loss, you will naturally think of other sub-normal departments that will add even more *eclat* to your Bureau of Public Relations, or, as they called it in ancient Rome, *Bureau Pro Bono Publico*. With the accent on the *Bono*, I believe.

Obviously, the success of any factory depends upon its Engineering Department, which is divided into two sections, Airplane and Financial. The Airplane Engineering Dept. we may dismiss with a few suggestions about sub-departments, such as Overweight Analysis and How Come Dept., Center of Gravity Shifting Dept., complete with lead to hang on the tail or engine mount as required; General Distress Analysis and Despair Dept., and Bureau of Destruction of Rejected Parts if Found.

The Financial Engineering should come directly under the supervision of the president, himself, though he may delegate to vice presidents such departments as: Stock Certificate Design, with special cross perforations so the certificate may easily be torn up by infuriated stockholders; Statistics of Sales, complete with magnifying glass; Yes Men's School and Rubber Stamp Dept., and last but very important, a Complete Canning Dept. for bankers' aeronautical ideas. It might be as well to include a Jiffy Name-Changing Dept., with Annex for Quick Mergers and Rapid Rehabilitation. But this is needed only by larger companies.

A Sales Department is of course necessary and must have many divisions, such as Commercial Sales, occasionally; Army and Navy Supplication and Crying Department, Army and Navy Explanation of Misunderstandings of Contract Dept., Army and Navy Rapid Change of Design Dept., Army and Navy Modification of Modifications Dept., Army and Navy Pacification of Infuriated Inspectors Dept. Incidentally, if you happen to sell a few airplanes occasionally, you expand your business to include Foreign Sales to Foreign Governments, with Special Legal Collection Department.

Well, friends, that's the complete set-up. It has all worked before, so there's no reason why it shouldn't work again. Take it, and my blessing with it. Personally, I am not going to use it myself. I'm organizing an insurance group to insure speakeasy proprietors against hostile search and seizure of bar fixtures.



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## ARE PILOTS PROFESSIONAL MEN?

*(Continued from page 31)*

trade. It takes a lawyer three or four years after graduation from college to acquire enough knowledge to secure admission to the bar. It takes four years plus one or two years' internship for a medical student to become a doctor.

Let us compare the aviator by these standards. During the war we taught the novice enough of the art to permit him to fly alone in a very short time. This was due to the pressure and demand of the emergency. Even then, however, he was not a real flier until he had put in an apprenticeship with a squadron and been through several auxiliary schools, such as gunnery, engineering, photography, and observation. Consequently I should say that even under our war scheme it took a college graduate two additional years to become a thoroughly trained flier.

Let us examine our peacetime system for training Army pilots. First must come four years at West Point or some technical institution, next a year at our flying school, then at least a year with a tactical squadron. Our Army flier is looked upon as an embryo until he has piled up at least a thousand hours in the air, covering a calendar period of two to four years. Even then he is not through, however. He must elect a specialty—engineering, maintenance, photography, etc. There is a school for each of these which he must attend. Each requires a year. Next comes the tactical school, consuming another year. Then follows the Command and General Staff School, taking two years, and last, the War College, calling for another full year.

As far as I know, there is not another profession requiring such long years of apprenticeship, so many years of schooling, as the Army pilot is forced to go through before he has run the full gamut, before he has mastered the profession of arms.

The active life of the soldier is thirty years. One-third of this he spends in schools. It is not difficult to understand, therefore, why the profession of arms has long been an honorable one. That was why in aristocratic Southern families, one son became a lawyer, a second a doctor, a third a minister, and the fourth a soldier.

Let us consider the training of the civil aviator of today. We have found by experience that he should be a college graduate or have the equivalent of a college education; otherwise he will scarcely be able to master some of the technical subjects which will confront him later. Then he begins his flying training. That, at any reputable school, will cover a period of ten months to a year for the bare flight essentials. The Department of Commerce will not issue his transport license until he has had a minimum of 200 hours. Even then no airline would employ him. He must next do an apprenticeship of 800 to 1,000 hours as co-pilot, riding beside an old experienced flier to learn the tricks of the trade which can be acquired in no other way. This will take two years. In the meantime, he must learn to use radio. He must become familiar with his engines. These two subjects alone will employ all his available time during those two years when he is not actually in the air.

He must become skilled in air navigation, which is no mean topic and compares not unfavorably with navigation at sea. Here the pilot will find considerable use for higher mathematics. Next come flying specialties in which he must be perfected, such as night flying, blind or instrument flying, etc.

So the training of the pilot in point of time compares not unfavorably with the learned professions. The cost

of pilot training is also quite an item. The complete course cannot possibly be given for less than \$5,000. Including the hours of apprenticeship he puts in, it will reach much nearer \$10,000. We spend more than that sum on every flier we train in the Army Air Corps.

Thinking the matter over, I can find no similarity, no point in common, between the first-class pilot and the automotive chauffeur.

The pilot more nearly resembles the skipper of a vessel at sea. In his hands lies the fate of all aboard his vessel; he is licensed by the Government, carefully examined, mentally and physically. He must navigate, but unlike the master of a vessel, he has no second mate to do it for him. He must make all decisions after the plane leaves the ground, but he cannot rely on first mate or chief engineer for advice and help. He is his own first mate, his own engineer.

The pilot must possess sound judgment to a high degree; he must be the essence of courage; all his physical reactions must be rapid and accurate. His duties require far above the average in physical and mental equipment.

The flier deserves a berth among the professionals. Whether it works out that way in the years to come, depends entirely upon the pilots themselves. If they organize to keep the standards high, as have the legal and medical professions, the desired result will be accomplished.

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*General Fechet will resume his series of articles on National Defense in the May issue of AERO DIGEST.*

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### METAL AIRPLANE CONSTRUCTION

*(Continued from page 34)*

flanges are formed or extruded channels, while the webs may be of the wandering type, vertical corrugations, thin web (tension field), or embossed truss-web type.

The second type will prove stiffer if the corrugations in the web are run lengthwise, provided there are proper vertical stiffeners built into the structure. It is very important in this case to prevent lateral failure of the beams, and a box type will be found efficient, provided the webs contribute to the compression strength of the beam. A conventional truss may be used to advantage if the structure is of steel, heat-treated after welding. In this case it will be necessary to employ double drag bracing.

#### **Ribs**

For shallow ribs it is possible to use stamped types, but with an increase in depth, ribs formed by this process are wasteful and inefficient. Ribs are usually designed as built-up trusses, and while the air loading is not known exactly, it is approximated with sufficient accuracy to warrant a rib analysis. This will enable a rational distribution of sizes. In rib design it is important to consider the method of fastening them to the beams and joints of individual members of the rib. The use of oval tubing for duralumin ribs, and of channels for steel ribs, seems to result in the most efficient structure.

Whatever the design, the attachment problem of ribs and beams is of extreme importance and must be given a thorough study. The attachments may represent individual clips, in which case it is usually necessary to have a vertical tie member in the rib. A more substantial bracket attachment, while somewhat heavier, leads to greater rigid-

*(Continued on following page)*

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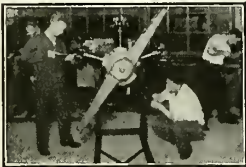
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(Continued from preceding page)

ity of the wing assembly and ribs in particular, and, although heavier, is preferable to individual clips. A spring clamp has been employed to attach ribs to steel beams.

### Compression Drag Members

The design of compression drag members must be made not only with a view of carrying the loads as a part of the drag truss system but with a view of preventing lateral failure of the beams and stiffening the wing assembly in torsion. There are numerous ways of designing compression drag members, but fundamentally these members may be subdivided into two classes, pure struts and combination rib and strut type. For a wing design employing typical beams and ribs it appears best to use a pure strut type; this allows spacing the ribs to a great degree independent of the drag trussing, permits of greater flexibility and more efficient drag truss design. The depth-to-length ratio of these members is such as to make a built-up truss a preferable type. The second type, however, may have a thin wall box construction or a combination truss and box design. Wings with metal covering intended to contribute to the strength of the assembly will not have a drag truss proper but will necessitate full depth main bulkhead type ribs to stiffen the assembly.

Proper attachment of such members to the beam and to the skin is of paramount importance.

### Fittings

The importance of the fitting design cannot be over-emphasized because of the usual complexity of stress distribution, high concentrated loads, vital effect on other parts of the structure from the consideration of strength, and proper stress dissipation into the main structure. Fitting design must be given attention equal to that of the primary structure; otherwise, a design starting out as an efficient arrangement might end up as an unnecessarily complicated, heavy, and inefficient structure.

One of the major considerations in proper fitting design is the stress dissipation into the adjacent structure to provide a uniform design with minimum reinforcements.

The types of fittings and conditions for which they must be designed are too varied to enable a comprehensive analysis, and this mention is intended to stress the importance of that phase of design and indicate the consideration to be kept in mind.

For production type airplanes the cost of fittings and other small parts can be reduced by use of forgings and stampings; therefore, such parts must be designed with this end in view.

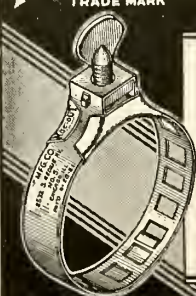
(To be continued in the May issue)

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**SACRIFICE SALE:** Warner Fleet; J-5 Waco straightwing; Kinner Standard Trainer; Challenger Eaglerock; New J-5 engine; other equipment. Any reasonable offer accepted. Cars in trade. Quick action necessary. Manitowoc Air Service, Manitowoc, Wisc.

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(Continued on following page)

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**FOR SALE:** The following licensed airplanes, all in excellent condition, always kept in hangars and serviced by licensed mechanics. 6-8 place Wasp Flamingo all-metal, \$3,800. Lycoming Stinson with specials, \$2,750. Inland Sport LeBlond '65', \$1,175. Two OX Robins with specials, each \$775. Curtiss-Wright Junior, \$775. Wire, write or telephone Iowa Airways Corporation, Fort Dodge, Iowa.

**OX-5 Eaglerock:** Never cracked; licensed; new covering, new motor, 75 hours; extra used motor. Deliver for expenses, \$650. George Heineman, 146 Coffey Street, Brooklyn, N. Y.

**JUST PURCHASED** new Comet powered Eagle-rock Sport Biplane, complete; instruments, brakes, steel prop., etc. Total time on ship less than ten hours. Financial conditions force me to sacrifice this ship at once. No reasonable offer will be refused. Wire your bid to: Chas. S. Concklin, 1119 Palmer Park Blvd., Colorado Spring, Colo.

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**FOR SALE:** Simplex Monoplane, licensed, paint like new, Kinner motor, eleven hours total time. Also Kinner motor 25 hours total. 6545 St. Mary's Ave., Detroit, Mich. Oregon 1229.

**AMERICAN EAGLE,** licensed, dual control, new airwheels and prop, equipped with brand new 45 h.p. Szekeley motor, \$695; Eaglerock, 180 h.p. Hissos, wings recovered, 38 hours on motor, \$695; Nicholas-Beezley Trainer, 88 h.p. Genet motor, new wings and fuselage, 35 hours on motor, \$1275; Great Lakes, latest type, 45 hours on Cirrus motor, overhauled and recovered by factory, guaranteed new condition, \$1650; Waco F, Kinner motor, perfect condition, motor completely rebuilt; looks like new, \$1695; Barling NB-3, excellent condition, steel prop, semi-air wheels, \$895; Cirrus motor, Mark III with new Standard steel prop, \$295; Two rebuilt OX-5 motors, one millerized, \$99; One Thompson 28 ft. back pack chute, \$25; other bargains; write us your needs. McClintock Bros., 7102 Mt. Vernon St., Pittsburgh, Pa.

**CESSNA** four-place cabin monoplane with new Warner motor. Exceptionally well-equipped, with Bendix oversize wheels and brakes, tail wheel, Pioneer Straightway compass, turn and bank, and rate-of-climb indicators; new navigation lights in addition to regular equipment. Price \$1900. K. Russell Smith, 394 Wyoming Avenue, Wyoming, Penna.

**USED AIRPLANES:** Bargains; licensed; perfect condition. Monocoques, Wacos, Buhls, many others. Secure our list. Aircraft Brokerage and Finance Co., Room 200, 205 W. Wacker Drive, Chicago, Ill.

**YOU CAN'T BEAT THIS.** OXX-6 Travel Air biplane, slightly used, like new. For quick sale \$750.00 cash. A lot of airplane for the money. W. S. Lephew, Logan Field, Baltimore, Md.

**WACO 10, OX-5 motor.** Very little time on ship and motor; licensed to October 1932. Will paint fuselage to suit or give full instructions. \$800. Hal Provost, Aero Trades Hangar, Roosevelt Field, N. Y.

**DON'T OVERHAUL** your OX-5 while you can buy a brand new one in original crate, Government inspected, tested and accepted; cosmoline'd inside and out, and in perfect condition; complete with magnets, carburetor, hub and wiring for \$168.50. Accept no substitutes. Can refer you to 50 tickled purchasers. Price advances May 1st. Karl Ort, 628 W. Poplar St., York, Pa.

**SPARTAN LOW WING,** Jacobs motor, steel prop. Privately owned; always hangared. Same as new. Dual side-by-side. Wonderful for students. Cruises on 4 gallons gas per hour. Pioneer compass included; ten months old. Purchased at factory May 1, 1931 for \$2275. Sacrifice at \$1085. F. J. Kirk, Box 95, So. Lancaster, Mass.

**HEATH HENDERSON:** like new; manufactured by Heath Company from brand new Henderson motor; deep crankcase, hub, prop, tachometer drive, oil gauge. \$100 crated. Fay Williams, Huron, Ind.

**TAPER WING WACO J-5;** 135 hours total. Ship and engine like new. Townsend ring, wheel pants. Priced at \$2250. Geo. Pynchon, Jr. Inc., Hangar Roosevelt Field, Long Island.

**FOR SALE:** Brand new Szekeley-powered Buhl Pup. This little ship licensed and equipped with airwheels. Price \$900. Will accept good automobile as part payment. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan

**ENGLISH CIRRUSS MOTOR** with late type cylinder heads and valves; perfect condition, \$225. Gypsy Moth Motor, practically new, \$250. 35 to 60 H.P. six cylinder Anzani with Story propeller, \$130, perfect condition. 16x3, 14x3 tires, tubes and wheels with ball bearings, \$14.00 each. 26x4 tires, tubes and wheels, \$16.00 each. The above are all non-skid straight side, best quality cord tires. Wheels are duralumin disc and include ball bearings. Parts for any make of motor. Cylinders and parts for Whirlwind, Wasp and Hornet motors. Write us about insurance wrecks. Full line of supplies. "If it flies we have it." Crawford Airplane Supply Co., Venice, California.

**CURTISS MOTORS:** We have cut the price of our OXX6 motors from \$175 to \$70 and the OX5 to \$50. We have only a few left. These motors are rebuilt like new and are the best buy on the market today. Write for full information. Grant Marine Motor Co., 827 Whittier Blvd., Detroit, Michigan.

## Miscellaneous Services Opportunities, Offers, etc.

**ESTIMATES** given on rebuilding and repairing. We will buy cracked ships and motors. What have you? Aero Repair Service, First National Bank Bldg., Seguin, Texas.

**AIR MAIL:** Want postcards and letters carried by airplane before 1920. Send stating lowest cash price to Francis B. Leech, National Press Building, Washington, D. C.

**OPPORTUNITY** offered several young men and women to earn Transport Pilot's course valued at \$4,000, with pay. Serious, steady workers preferred. Enclose snapshot. Victor S. Pacheco & Co., Box 564, Lincoln, California.

**DON'T BUY ANYTHING** till you get Ort's latest and greatest 1932 catalogue with the small prices in it. Send dime today. Karl Ort, 628 W. Poplar St., York, Pa.

**STUDY FLYING** at home. Save hours of air time. Complete course of ten volumes, \$10.00. Originally \$25.00. Hissos Eagle, stored for two years, excellent shape, as is, \$800.00. Irwin Meteorplane, flown twice, cost new \$1450.00, now \$175.00. F.O.B. Boston. Fred Pereira, 604 South St., Rosindale, Mass.

## Patents and Inventions

**INVENTOR'S UNIVERSAL EDUCATOR.** Contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., 602-C, Ouray Building, Washington, D. C.

**PATENT YOUR INVENTION:** Send for Free book, "How to Obtain a Patent," and "Record of Invention" blank. Consult us about how to protect your ideas. Victor J. Evans & Co., 634-C Victor Building, Washington, D. C.

## Wanted To Buy Or Trade

**WANTED:** Gates-Day Standard, with or without motor, Hissos or J-5. Give complete details. Address Room 1439, 134 S. La Salle, Chicago, Ill.

**WANTED:** New replacement parts for J-5 Wright Whirlwind engines. Quote lowest cash price on cylinders, pistons, tappets, guides, etc., by letter to MacRobertson-Miller Aviation Company, Limited, Box 448 D, Adelaide, South Australia.

**WANT TO BUY:** Aeronca, single place job preferred or what have you for \$200.00 cash. Jack Thomas, 423 West Lexington St., Danville, Kentucky.

**WANT:** Warner or LeBlond "110," or will trade new upright Cirrus with motor mount, propeller, cowling. Write details and price. Brown Metal-plane Co., Spokane, Washington.

**WANTED:** A cracked Eaglerock A-3, or parts, especially wings, good or bad. Also will consider American Eagle or something similar. Bob Starrett, Sheldon, Iowa.

**WANTED:** Waco F Challenger, Travel Air or similar ship. No junk. Send complete description, photo and best cash price. Carl Tauch, Marquette, Michigan.

**WANTED:** Best cash buy in licensed six place Bellanca, also 4650 floats. Please describe fully. William H. Turgeon, 279 Sabattus St., Lewiston, Maine.

**WILL PAY CASH** for parachute. Must be government approved. What have you for around \$100.00? Dr. E. R. Beiderwell, Bird City, Kansas.

**AERIAL MAPPING CAMERA** and equipment wanted: Give description, condition and price. Dan Lake, Lake City, Kansas.

**WANTED:** Detachable OX-5 motor mount and cowling for '29 American Eagle. Also good used late production OX-5 prop. State condition and price. Post Office Box 391, Port Arthur, Texas.

**WANTED:** A Stinson Jr. powered with engine of 200 h.p. or more. Must be licensed and in perfect condition. Karl Ort, York, Pa.

**WANTED:** One pair airwheels, prefer size 25 x 11 with brakes. Will consider other sizes without brakes. State condition and lowest cash price. Wm. H. Wilhelm, P. O. 792, Alliance, Ohio.

**WANTED:** Wings, center section, radiator, all struts, and wires for Waco 10; must stand Government inspection and be cheap. P. S. Hayden, 3354 Russell Place, St. Louis, Mo.

**LOOKING FOR PLANE:** Have a real good quarter section of land to trade for licensed plane; will consider Radial or OX-5. AERO DIGEST, Box 1307.

**WANTED:** Three or more place open or cabin ship, also pontoons for same. State full particulars. Leon D. Smith, 52 Elmira St., Mansfield, Penn.

**WANTED:** Best buy in slightly used, late model, 100 h.p. Kinner, with new type head. New standard Flying Service, Box E, Hashrouck Heights, New Jersey.

**WANTED:** Wings for J-6-9, Stinson SMIF; must be in airworthy and licensable condition. New Standard Flying Service, Box E, Hashrouck Heights, New Jersey.

## Parachutes For Sale

**PARACHUTES:** Approved type. Seat, back, lap and chest, hought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonist furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

**TWO USED IRVING** pongee parachutes; never jumped. Just repacked, in good condition. Price \$150. Turner Salter, Box 454, Raleigh, North Carolina.

# CLASSIFIED ADVERTISEMENTS

10¢ per word; \$2.50 minimum. Payable in advance.

## Positions Wanted

**LICENSED MECHANIC, A & E.** 5 years experience on repairing and servicing of planes and engines. Recently employed by Chance Vought Aircraft Corp. Position with future opportunities considered above salary. Age 25. References. AERO DIGEST, Box 1301.

**ENGINEER,** nine years' experience design, construction flying boats and landplanes, expert stress analysis and metal structure design, seeks responsible position offering future opportunities. AERO DIGEST, Box 1275.

**TRANSPORT PILOT,** class 1A and 2A ratings. Recent honor graduate of leading air school. Well trained in careful flying. Age 20. Best references. Prefer connection with private concern or party. Go anywhere. A. L. Laney, 1319 Hilton Avenue, Columbus, Georgia.

**L. C. PILOT** desires position: approved school trained. Flying time more important than salary. Age 21, single, excellent references. E. H. Friddle, Route No. 1, Stokesdale, N. C.

**L. C. PILOT,** 25, married. Graduate of government approved school. Good record, best of references. Have flown six types of ships. Will go anywhere. John W. Townsend, 5130 Locust Street, Philadelphia, Penna.

**TRANSPORT PILOT** desires position: on any proposition. Approximately eight hundred certified hours. Night flying, cross country and instruction experience. Open and closed ratings. Salary secondary. AERO DIGEST, Box 1300.

**YOUNG MAN,** 25, finishing enlistment in Navy, desires aviation connection offering opportunity to learn. Excellent references; will work hard for living and expenses or part time work in school. Will go anywhere. Available May 1st. Thomas Fallon, U. S. S. Hale, San Diego, Calif.

**LICENSED AIRPLANE & ENGINE MECHANIC:** 25, U. S. Army Air Corps, Technical School graduate, capable all classes of airplanes and engines; rebuilding and repair; lone experience, go anywhere; best references. Prefer connection with private concern or party. Mathew Woods, Box 793, March Field, Riverside, Calif.

**DESIRE CONNECTION** with aviation industry. Will do any work pertaining to aviation. Have been flying three years. Speak Spanish fluently. References. Fred Pinnegar, Dunsmuir, California.

**AERONAUTICAL ENGINEER:** Efficient in public relations and sales. Age 23, Minnesota graduate. Student under Boeing Scholarship. Graduate Boeing School Aeronautics. Competent in complaints, surveys, publicity, traffic, liaison, correspondence, and instruction. AERO DIGEST, Box 1302.

**MASTER MECHANIC,** licensed airplane and engine, age 28. Eleven years experience, both field and factory, experimental. Expert welder, experienced all types motors and capable of producing fine piano finish dope jobs. Also licensed pilot, clean record. At present employed. Used to working seven days a week, all hours. No objection to South America. Best references. AERO DIGEST, Box 1303.

**TRANSPORT PILOT,** with radio and telephone experience, speaks, reads and writes German and English; I.C.S. engine graduate, age 23, will go anywhere. AERO DIGEST, Box 1304.

**MECHANIC:** College graduate, 22, trained for two years in airplane and engine, desires connection with factory, field or private party. First class references; go anywhere. Harold Ickes, Loysville, Pa.

**TRAFFIC REPRESENTATIVE:** Excellent background of experience; real business producer, fine record, good appearance; thorough knowledge publicity, exploitation, passenger traffic, mechanical details. Available April 15th. AERO DIGEST, Box 1305.

**YOUNG MAN,** 19, trained in airplane and engine mechanics, also welding, wishes starting position in industry. Vincent Alekna, 627 West 18th Street, Chicago, Illinois.

**AERO CLUBS, AIRPORTS,** established or prospective, do you want an operator, licensed equipment, pilot and mechanic? Now operating Bethlehem Airport. What have you? Write particulars. James S. Christman, Bethlehem, Penn.

**YOUNG MAN,** Irish, 19, wishes position with barnstormer as helper. Will do parachute jumps. Will go anywhere. Johnston Robinson, Jr., 332 East 94th St., New York City.

**GIRL,** limited commercial license, wishes any type position paying flying time, living expenses. No investments. References. Fare must be paid out of city. AERO DIGEST, Box 1306.

**YOUNG LADY,** 27, limited commercial pilot, 135 hours. Reputed by former instructors to possess flying ability above the average. Have put on exhibition flights for publicity purposes, etc. Desire connection where I may build up more hours. Will go anywhere. Excellent references. AERO DIGEST, Box 1308.

**AERIAL PHOTOGRAPHER,** age 28, eight years' experience obliques and high altitude mapping with all types cameras; now employed, desires change. Experienced laboratory and mosaic man, also sales. Best references. AERO DIGEST, Box 1282.

**TRANSPORT PILOT:** 6000 hours, fourteen years' flying. Open and closed rating. Prefer private flying or instruction. Best references. Will go anywhere. AERO DIGEST, Box 1253.

**TRANSPORT PILOT:** Age 30, with A & E mechanic's license, eight years' experience, 2500 hours, desires connection. For the past five years have operated and managed small but successful airport. AERO DIGEST, Box 1288.

**L. C. PILOT,** with ship. 60 hours of solo cross country experience. Willing to work; will go anywhere. Recommendations. Paul Patin, Sand Lake, Michigan.

**TRANSPORT PILOT:** Single, Army trained, with J-6 four-place cabin plane. Pontoons, camera. Open to any proposition. Go anywhere. Moderate salary. AERO DIGEST, Box 1309.

**L. C. PILOT,** 75 hours; have flown nine types of ships. Will work about hangars. Five months engine shop. Careful and competent. Will travel. Pilot, 853 Seventh Street, Brooklyn, N. Y.

**TWO AIR PILOT-ENGINEERS,** recently in Royal Canadian Air Force, offer their expert services to persons interested in mineral developments in northern Canada. AERO DIGEST, Box 1311.

**ARMY TRAINED PILOT and MECHANIC,** 4500 hours, all types. Wants position private party or airline. Box 63, Wall Street P. O., New York City.

## Model Aircraft and Gliders

**MODEL AIRPLANE MATERIAL:** Five large sheets Japanese tissue, 20 x 24; bundle various sizes balsa; rubber band and price list; all for 25c. Five kits for \$1.00. Aero Shop, 3050 Huribut Avenue, Detroit, Michigan.

**GEARLESS TRANSMISSION** for Model Airplanes, 40c. Doubles duration of flying models. More power. Weight 1/25 ounce. 5c brings circular showing three types of transmission and prices. Alfred A. Housepain, 2322 Stuart St., Berkeley, Cal.

**LIGHT PLANE AND GLIDER** dural fuselages. No welding, brazing, riveting or cast terminals. 10c in stamps brings circular. Roman B. Maliszewski, 1606 E. Bellevue Place, Milwaukee, Wisconsin.

## Miscellaneous Products & Equipment For Sale

**FOR SALE:** Liberty, Lawrance, Hall-Scott, Curtiss, Gnome motors and parts. Eaglerock fuselage, propellers and miscellaneous equipment. Lowest prices. Write Box No. 877, Aberdeen, So. Dak.

**BARGAINS:** In motors, propellers and hubs for lightplanes, iceboats, windwagons. Indians with propellers \$35; Fords \$50 and \$60, ready to fly. Propellers \$4.75 to \$12.00. Flying Flivvers \$650; Blueprints \$5; Monocycles, easy to ride, \$20; Blueprints, \$3; Circulars, 10c. Storms Aviation Co., Spartanburg, S. C.

**FLIGHTEX COVERS COMPLETE,** for Waco, Travel Air, Eaglerock, Swallow, American Eagle, Commandaire, Lincoln Page; other like biplanes, \$75.00; Fuselage covers, \$14.00; Wing covers, \$12.00; others proportionately. 10 gallons dope, \$1.25 gallon; Thinner, \$1.50 gallon. Supplies. Ostergaard Aircraft, 4305 North Narragansett, Chicago, Ill.

## The answer is as simple as A-B-C

**A**ERO DIGEST publishes more classified advertising than any other three or four aviation magazines combined. That is because, through its large circulation, it sells the advertised products more quickly.

Here is how one advertiser\* expresses it—"Regarding my advertisement in the Wanted columns of your March issue, I certainly must say it pays to advertise in AERO DIGEST. I have had so

many replies that now I am at a loss to know where and what to buy, so I'll come to your department for advice. I would like to know, etc., etc."

The cost of advertising in the DIGEST'S classified columns is very little—only 10 cents per word (\$2.50 minimum), payable in advance. May forms close April 20th.

\*Name on request.

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# CLASSIFIED ADVERTISEMENTS

10¢ per word; \$2.50 minimum. Payable in advance.

## Miscellaneous Products & Equipment For Sale

**FOR SALE:** Complete set of Waco Ten or Ninety wings and tail surfaces covered and licensable, priced right. Also have new K. R. Wilson Ford main bearing babbitting and boring machine for models A & T to trade for good seat pack chute, adjustable steel prop for OX5 or air wheels for Waco Ten. C. M. Hall, 450 N. South St., Wilmington, Ohio.

**ASSEMBLE YOUR CORBEN Baby Ace Sportplane** from our complete semi-built kits. All major parts and units are factory built. Send dime for detailed literature. Corben Sportplane Supply Co., Peru, Indiana.

**MAGNETOS, ALTIMETERS, TACHOMETERS, Turn Indicators, etc.** Expert repairing and testing of any instruments. Repair estimates if desired. Government Licensed Mechanics. Streed Electric Co., 1312 Harmon Place, Minneapolis, Minn.

**BRAND NEW Zenith carburetors for OX-5, Hissco or Hall-Scott motors, \$9.95 each.** Karl Ort, 628 W. Poplar St., York, Pa.

**ZENITH ALTIMETER** and liquid type lateral banking indicator, two complete instruments for \$5.00. Special pursuit high altitude, 26-28,000 foot Altimeters, \$7.00. Banking indicator, \$1.00. Liquid type inclinometer, \$7.00. 750 x 125 Wheels, \$4.00. Turnbuckles 7 and 10 cents. Robert F. Britton, 4218 Lindell Boulevard, St. Louis, Missouri.

**SPARTAN C-3 PARTS.** Wings for 1931 and 1929 models. 1931 fuselage, center-section gas tank, many other parts. Diamond Airport, 519 West Summit Ave., San Antonio, Texas.

**NEW PLACEMENT PISTONS:** For J-5 standard or any oversize, including Perfect Circle Rings, \$3.95 each; High Compression OX-5 Perfect Circle Rings, \$2.27 each; limited number; order today; write for catalog! Airmarine Sales & Service, Lansing, Michigan.

**SAVE MONEY:** Sportplanes low as \$150; Engines \$25; Propellers, Balloons, Parachutes, Instruments, Parts, Wheels, Tires \$2, etc. Send 50c for Purchasers' Manual. Aerobuilders Service, 1305 So. 12th, Lincoln, Nebraska.

**I BUY AND SELL:** Used Aircraft Parts, Motors, Instruments, Propellers, Parachutes. What do you need or what have you to sell? W. H. Schwieters, Hadley Field, New Brunswick, N. J.

**COMPLETE TAIL,** two upper wings, wires and miscellaneous parts for D. H. Moth; very reasonable. Wings covered or bare. Upper spars, ribs, etc. Somerset Flying Service, Somerset, Pa.

**BLUEPRINTS:** Complete working drawings for 160 m.p.h. tiny low wing racer, powered with 63 h.p. inverted, air-cooled engine from Ford A parts, \$2.00. Air-Dale Aircraft, 2320 Isabella St., Evanston, Ill.

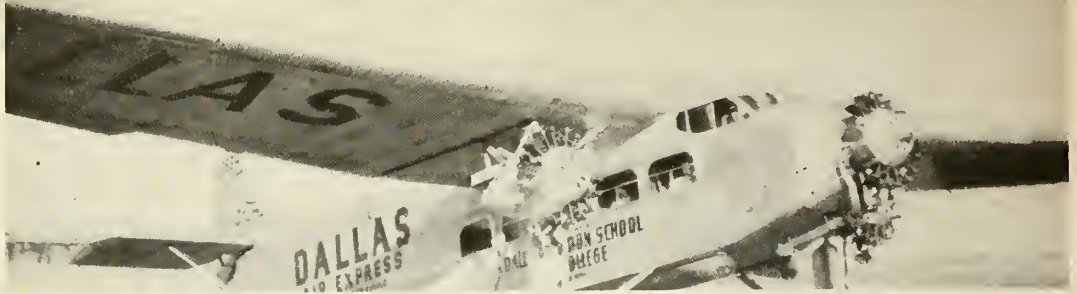
**OXX PARTS:** Used, but in good condition. Scintilla magneto for above motor, cheap. Make offer for any OX-5 or OXX parts. Box 1118, Raleigh, N. C.

**SCINTILLA MAGNETOS, 2,** type VAG9D, absolutely new, \$45 each; new complete LeRhone 80 h.p. engines, complete, including throttle assembly, ignition switch, oil sight gauge, etc., \$40; write for complete list. Cie. Internationale Aeronautique, 4003 Roland Ave., Baltimore, Md.

**CLEAR NITRATE DOPE, 5 gallons, \$3.00.** Yellow, green, or olive drab pigmented dope, 5 gallons, \$3.50. Set of used 20 x 9 airwheels, \$45.00. Used parts for Waco Ten. We buy and sell all kinds of aeronautical equipment. Dowden Engineering Co., Bristol, Pa.

## Dallas Aviation School and Air College

U. S. Government, Department of Commerce-Approved Transport School



*The only aviation school in America that owns a tri-motored Ford*

# COMPARE SCHOOLS— COMPARE PRICES—

*Then You Will Come  
To Dallas!*

"Best aviation school in the country," says Cloyd Clevenger, author of "Modern Flight." We give you the best of everything that really counts—up-to-the-minute ships and motors, veteran instructors, ideal flying weather all year, pleasant and interesting surroundings at Love Field—Dallas' \$2,000,000 airport. *What more can a school offer?*

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This is the South's foremost flying school. Texas has the best every-day flying weather in the U. S. We train you quicker—and that's another big saving.

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The best equipment—the best instruction—the best location—the best weather—the best school. But not one cent of needless expense!

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**FREE RAILROAD FARE** From your home to Dallas when you enroll for Transport or Commercial Course—half fare for Private Pilot's or Mechanic's Course.

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#### TRANSPORT COURSE - \$2500

The full course of 200 air hours with complete ground school. Qualifies for transport license.

#### COMMERCIAL COURSE - \$795

Fifty hours of training in the air, with full ground school course in classrooms and shops.

#### PRIVATE PILOT'S COURSE - \$350

Twenty air hours and the complete ground course.

#### MASTER MECHANIC'S COURSE - \$350

Twenty weeks' thorough instruction: upkeep, repairs, maintenance, welding. Classrooms and shops.

#### SPECIAL RADIO AND WELDING COURSES

*Ask About Them*

## RIGHT NOW!

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Welding—Mechanics' Course*

# DALLAS AVIATION SCHOOL AND AIR COLLEGE

Located at Dallas, Texas :: *Where Aviation Is at Its Best*

Major Bill Long, President

C. E. Harman, General Manager

**YOU** wouldn't shoot a bullet  
sideways, *would you?*



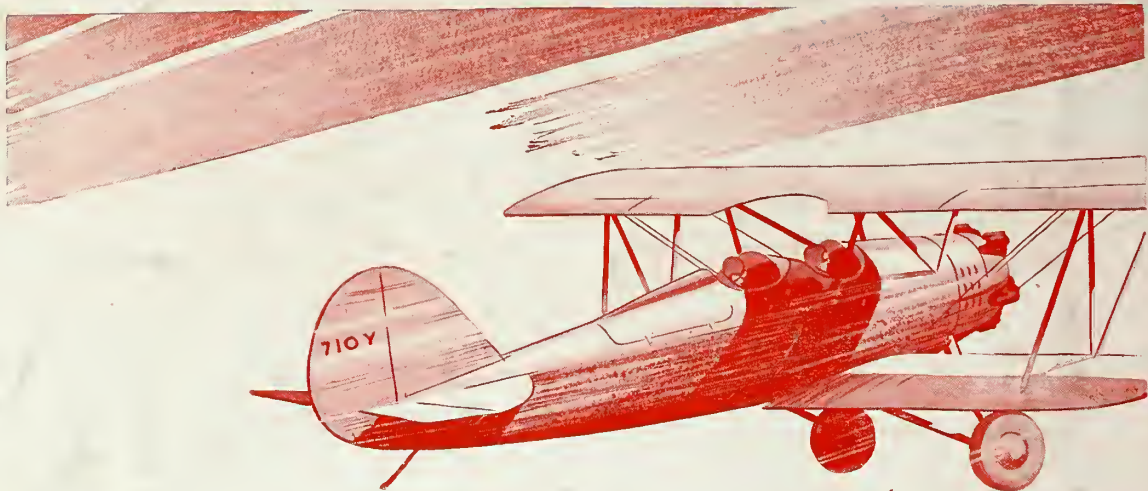
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INVERTED    IN-LINE    AIR-COOLED

**T**RYING to force a motor broadside through the air has the same disadvantages. Too much useful power is wasted fighting air resistance. ¶ For this reason the Menasco in-line inverted engine, which reduces frontal area to about the width of one cylinder, is more efficient, more economical, smoother and less expensive to main-



tain. A Menasco engine works LESS to produce more power! ¶ Menasco engines are available in three different horsepowers: The 95 H.P. and 125 H.P. four-in-line, inverted air-cooled engines; and the 160 H.P. six-in-line, inverted, air-cooled engine. Menasco Motors, Inc., 6718 McKinley Avenue, Los Angeles, California.



# A good start

There's something about a good start that gives added confidence in any venture. It is particularly significant to the air pilot.

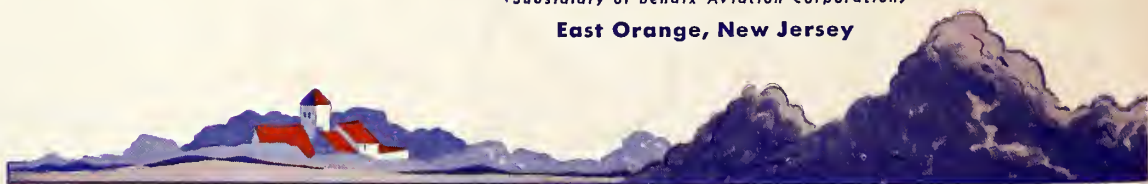
Eclipse Aviation Starters have given this good start to pilots for a great many years. Most flights originate with the sure action of Eclipse Aviation Starters and Generators.

This record has nothing to do with luck. Dependability and reliability are built into Eclipse Products at the factory.

**ECLIPSE AVIATION CORPORATION**

*(Subsidiary of Bendix Aviation Corporation)*

**East Orange, New Jersey**



MAY 1932

35 CENTS

# AERO DIGEST

**JAPANESE  
AIRWAYS**

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**NEWEST  
ENGINES**

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**METAL  
AIRPLANE  
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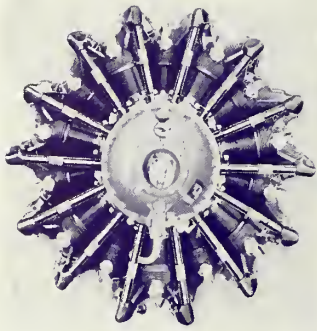
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BY AIR**

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With the release of this announcement, a distinctly new engine takes its place in the Pratt & Whitney line. Built to specifications of the United States Navy and developed with the cooperation of its Bureau of Aeronautics, the Twin Wasp Junior lives up to rigid Navy standards of precision, dependability and flight performance. The new air-cooled engine, a fourteen cylinder, radial type, develops 625 horsepower at 2100 r.p.m. It weighs 1.33 pounds per horsepower.

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the interest of military designers upon this newest Pratt & Whitney engine are certain to find wide application in the transport field.

It is characteristic of the engineering leadership of The Pratt & Whitney Aircraft Company that this organization should be the first in America to bring out a line of two-row radial air-cooled engines.

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**PRATT & WHITNEY AIRCRAFT CO.**  
EAST HARTFORD . . . CONNECTICUT, U. S. A.  
*Division of United Aircraft & Transport Corporation*  
Manufactured in Canada by Canadian Pratt & Whitney Aircraft Co., Ltd., Longueuil, Quebec;  
in Germany by Bavarian Motor Works, Munich;  
and in Japan by Nakajima Aircraft Works, Tokyo.

**Wasp & Hornet**  
Registered Trade-Mark  
*Engines* 





# 7 SIMPLE RULES for LUBRICATION ECONOMY

1. **Keep your engine in Good Mechanical Adjustment.** Oil leaks, worn piston rings and loose bearings account for large oil losses. Excess oil temperature and pressure are costly, too. Be sure they are well within the manufacturer's recommended limits, installing an oil cooler if necessary.
2. **Watch your R. P. M.** The average engine, at full throttle, consumes more than twice the quantity of oil used at a cruising speed of 85% maximum r.p.m.
3. **Use an Oil of the Viscosity Recommended by the Engine Manufacturer.** Every engine is designed with bearing clearances requiring a lubricant of definite viscosity (or body) at operating temperature. Never use a heavy oil solely for the purpose of cutting consumption—excess wear will result.
4. **Use an Oil having a Good Viscosity Ratio.** The operating temperature of the engine may vary under different conditions. When heated, all oils tend to thin out. Light oils are more readily consumed than heavy, hence the lubricant changing least with changes in operating temperature will assure the minimum consumption consistent with adequate protection.
5. **Use an Oil having a High Flash Point.** As oil vapors are lost through the breathers and combustion chambers, the more volatile the oil the greater the consumption. A measure of volatility is the *flash point*, the lowest temperature at which the vapors arising from the oil will ignite in the presence of a flame. For oils of a given viscosity, the one having the highest flash point is least readily consumed in the engine.
6. **Use a Superior Grade of Gasoline having Good Anti-Knock Value.** Since any factor increasing engine temperature increases oil consumption, a cool-running engine is an aid to economy. Within limits, the better the knock rating of the fuel used, the lower the engine temperature.
7. **Above all, demand a branded lubricant offered by a reputable manufacturer.** This is your assurance that other characteristics of the oil affecting oxidation and sludging are correct.

*Stanavo Aviation Engine Oil was developed after exhaustive laboratory and flight tests by the most experienced and reputable producers of petroleum products. It is made to meet exactly the needs of present-day aviation engines—and its quality is uniform the world over.*



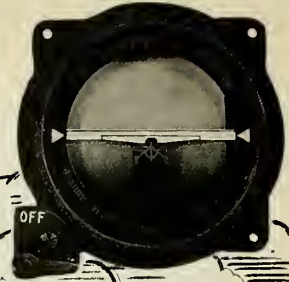
## STANAVO AVIATION ENGINE OIL

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*Organized and Maintained by*

Standard Oil Company of California  
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The Sperry Horizon and Directional Gyro are rugged, dependable, direct-reading flight instruments requiring no interpretation; are dead beat and permit of many hours continuous flying without "concentration fatigue."

For further information please write



# SPERRY GYROSCOPE CO., Inc.

BROOKLYN - NEW YORK



## *Faster than two miles per minute*

FORTUNATELY the characteristics of any aircraft become apparent in actual demonstration. Therefore any assertion made about the Autogiro is subject to proof or disproof in actual flight.

If this were not so we might be disturbed by some of the misinformation that is passed along by the pseudo-expert.

"It has no speed!" is an example of that kind of thing.

As a matter of real fact, there are present Autogiro models with top speeds of more than two miles a minute and with

cruising speeds up to 100 miles per hour.

Of course, from the standpoint of practical use by most private owners, this high speed is less important than the Autogiro's ability to also fly slowly, as no airplane can.

For most persons its ability to take off from and land on almost any cleared piece of ground with security is its greatest appeal—plus the fact that it cannot tail spin, that it can hover momentarily over a given point, glide or descend vertically.

All of the Autogiro's great contributions to the practicality of private owner flying have been achieved without appreciable sacrifice of the airplane's desirable features.



ABOVE PICTURES SHOW CAPTAIN YANCEY IN CHAMPION AUTOGIRO EXPLORING MAYAN RUINS OF YUCATAN, MEXICO

The Autogiro Company of America is an engineering and licensing organization. It owns and controls, exclusively, all Autogiro patent rights in the United States. Manufacturing companies of high standing will be licensed to build Autogiros with the full cooperation of our engineering staff.

Present licensees are: Buhl Aircraft Company, St. Clair, Mich. . . . Kellett Autogiro Corporation,\* Philadelphia, Pa. . . . Pitcairn Aircraft, Inc.,\* Willow Grove, Pa. . . . F. W. Steere Company, Bar Building, White Plains, N. Y.

\*Now in production.

# AUTOGIRO

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## Curtiss-Wright offers Practical Training in All Branches of Aviation



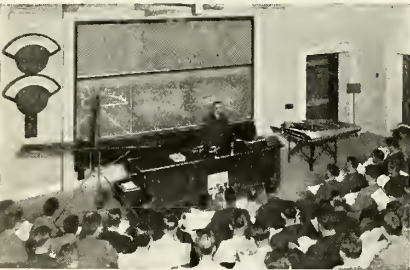
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Curtiss-Wright training is built on sound and proven methods of ground and flight instruction—based on 22 years of experience. Over 8 million miles have been flown by Curtiss-Wright students in dual and solo instruction. Nowhere else can you get as sound and as complete aviation training.

Curtiss-Wright Schools, located at the nationwide chain of Curtiss-Wright Airports, offer the best approach to Aviation that you can possibly find. They have the facilities—modern planes and engines, classrooms, laboratories, and shop equipment of every kind. Thirty million dollars have been invested by Curtiss-Wright to make these airports great centers of Aviation activities.

Here you come in contact with every branch of Aviation—scheduled air mail and passenger transportation, cross country charter operations, sport flying, aircraft sales, service and field administration. You gain a knowledge of every phase of the inside functioning of modern Aviation.

Back of every school stands a great organization—the Curtiss-Wright Corporation—which designs and builds all types of commercial aircraft and engines and military aircraft and engines for the United States Government . . . the famous Curtiss Falcons, Hawks, Hell Divers, Condor and Keystone Bombers . . . the Curtiss Challenger and Conqueror Engines and the Wright Cyclone and Whirlwind Engines — that

powered Byrd's flights over both Poles, Lindbergh's flight to Paris, Kingsford-Smith's Around-the-World Flight, Boardman and Polando's World's Record Long Distance Flight from New York to Istanbul . . . and many other famous endurance and ocean flights.

Learn to fly—it's the greatest sport in the world—or start now to prepare for a ground career in Aviation. Flying instruction includes Private, Limited Commercial and Transport Courses—approved by the United States Department of Commerce—and Special Flying Courses on a low hourly basis. Professional and trade courses include Airplane Mechanic, Engine Mechanic, Aeronautical Engineering, Radio, Aerial Photography, Ground School, Instrument Specialists, Parachute Rigging and Airplane Welding.

Aviation is a modern, new industry that is growing steadily. Judge for yourself how great the expansion will be during the next few years—and how numerous the opportunities.

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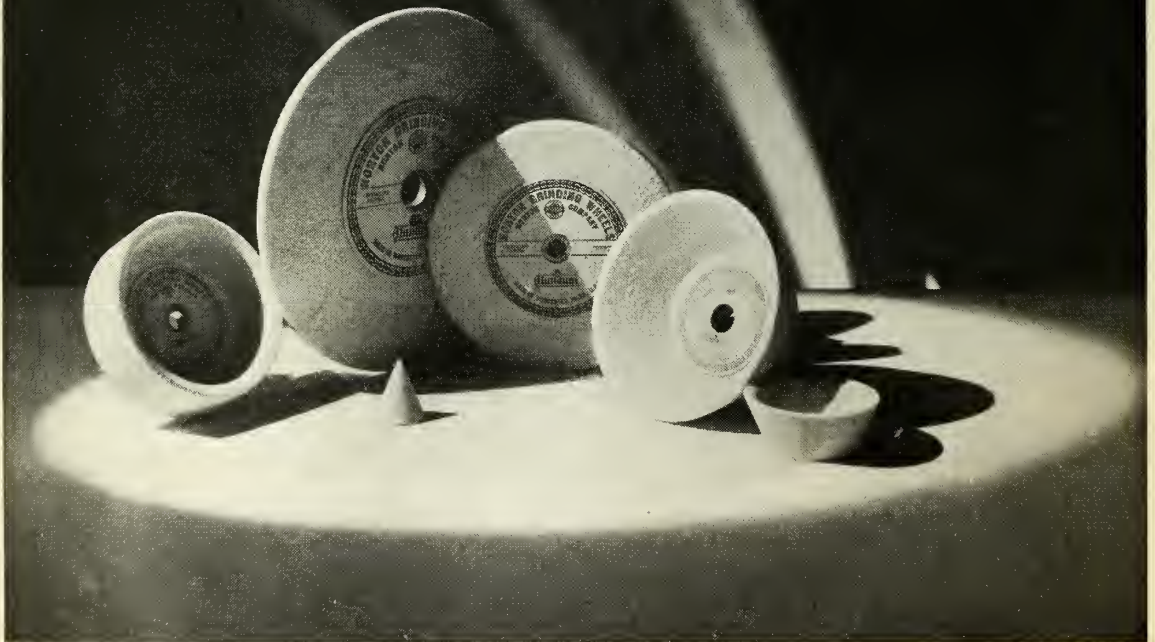
## FLYING SERVICE

NEW YORK CITY

CURTISS-WRIGHT CORPORATION

## Tools that Maintain Tools

Into the tool crib and out » « a continual flow of drills, reamers, cutters, taps, dies, jigs and fixtures » « tools whose accuracy controls the production accuracy of the shop. And the grinding wheel is the tool that maintains these tools » « that gives them the accuracy necessary to produce accurately. For high speed steels and steel alloys there is a Norton Tool Grinding Wheel » « Alundum Abrasive bonded by a new and patented process.



**NORTON COMPANY, WORCESTER, MASS.** — Grinding and Lapping Machines • Grinding Wheels, Abrasives, Pulpstones, India Oilstones • Laboratory Ware, Refractories, Porous Plates • Non-slip Tiles, Treads and Aggregates

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# LEADERSHIP ...INCURS AN OBLIGATION


## WHICH WACO RECOGNIZES AND ACCEPTS

Spurred on by this relentless obligation of leadership, WACO is offering a selection of airplanes that excel all previous WACO attainments. The new



"Model A", designed especially for the use of private owners, is generally conceded to be the outstanding new development of

the year. The cabin WACO,  further refined and improved, remains without an equal in performance characteristics among all cabin

airplanes.  The famous Model F, and its big brother, the "F2,"

familiar at every airport in the land, are continued in production practically without change. In each one of the seventeen models



making up the WACO line for 1932, there is evidence of still greater amplification upon the WACO standards of PERFORMANCE and of VALUE which have earned for WACO its leadership in aircraft registrations. The evidence is confidently presented for your inspection. For WACO has again kept faith.

THE WACO AIRCRAFT COMPANY, TROY, OHIO



"ASK ANY PILOT"

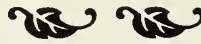


WACO LEADS IN AIRCRAFT REGISTRATIONS

**THE BURNELLI TRANSPORT** is the result of a thorough development program of construction, test flying, and research which has been carried forward since 1920.

The design is based on the flying wing type (an airfoil section with cargo space and multi-engines at the entering edge) applicable to military and commercial service.

The advancement of air transportation is dependent on a rapid increase in the inherent qualities of design to provide the maximum speed, safety and space with reduced construction and operating costs. An analysis of the Burnelli design relating to aerodynamics, power with structural arrangement, cargo space and mechanical details, clearly indicates that it will meet these essentials in a superior way. It correctly combines the aerodynamic efficiency of the single engine type with the power reliability and size increase of the nacelle type, plus other desirable safety and structural features.



## DESIGN COMPARISON PRACTICAL ADVANTAGES

	High Speed Single Engine	Burnelli Twin Engine
Horsepower .....	425	1,200
Gross weight .....	4,700	13,300
Frontal area of fuselage, square feet..	17.5	50
H.P. per square foot of frontal area..	24.2	24
Cargo space, cubic feet.....	135	550
H.P. per cubic foot of cargo space...	3.15	2.12
Drag coefficient of body ideally faired..	.00016	.00022
Engine with cooling system.....	.00030	.00030
Lift coefficient of body.....	0	.0020
Equivalent wing area saving feet....	0	140
Equivalent resistance saving flat plate	0	1.22
Resulting comparative body resistance per 100 H.P. equivalent flat plate...	.305	.290
Percentage of engine power required by body at 190 m.p.h.....	28%	21%
Engine power required at 190 m.p.h. per 100 cubic feet of cargo space..	88	46

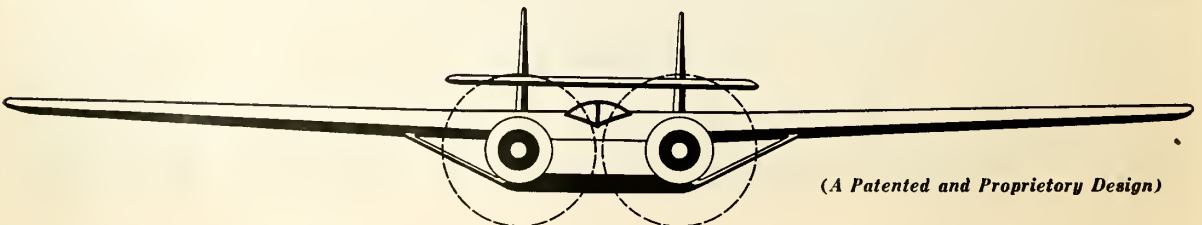
1. Accessible Multiple Engine Compartment, allowing inspection and minor repairs during flight.
2. Extensive Reduction of Head Resistance, necessary to high performance.
3. Reduced Turning Moment on One Engine, assisting flight with one motor operating.
4. Fuselage Lift Reduces Landing Speed, valuable for greater speed range.
5. Increased Capacity of Fuselage, maximum space for comfort and light cargo.
6. Practical Landing Gear Retraction, for increased aerodynamic efficiency.
7. Superior Safety in Operation. Protection afforded by engines and propellers being well forward of pilot's and passenger cabin.
8. Structural Efficiency and Simplicity. Stresses of engines, propellers and landing gear bear no relation to wing truss.
9. Convertible to Seaplane or Amphibion. The wide fuselage permits efficient twin float attachment interchangeable with landing gear.

## AERODYNAMIC BASES

The aerodynamic advance of this design is due to the following as set forth and extracted from wind tunnel research report of the Guggenheim School of Aeronautics, New York University:

1. The use of airfoil shaped body while providing large internal space contributes substantially to the lift.
2. The body being of airfoil form has a very low drag coefficient.
3. The high wing monoplane gives the most efficient wing and body combination.
4. The design allows for retraction of the landing gear together with a high wing and body combination.
5. The design permits the use of twin engine installation without penalty in additional frontal area.

UPPERCU-BURNELLI CORPORATION, KEYPORT, NEW JERSEY



(A Patented and Proprietary Design)



Right:

A Spartan School hangar and office building—one of the splendid buildings of this school.

Unexcelled flying equipment includes five different types of ships—all radial motors — two low-wing monoplanes — ships equipped for blind flying and radio and night flying.



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LIMITED COMMERCIAL COURSE Was \$900 Now only..... <b>\$650</b>	TRANSPORT PILOTS' COURSE Was \$2750 Now only..... <b>\$1975</b>	

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More than 38 states furnish the student body of the Spartan School. The best of buildings, barracks, class rooms and equipment, as required for the highest rating by U. S. Department of Commerce. Tulsa—"Oil Capital of the World"—in the heart of the romantic southwest, all-year-round flying weather—scenery of every type and description—"World's Busiest Airport." Uncle Sam's greatest aviation training center is located in the great southwest because of its numerous advantages. Spartan offers the same ideal surroundings and attributes.

Take your place in the famous DAWN PATROL—most famous of all commercial aviation student formations—for thrilling, instructive cross-country flights. Live in the school barracks and eat at the school restaurant if you like. Write at once for full information of courses, etc. Address Box 2649, Tulsa.

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You can continue your High School or two years of College at the Oklahoma Military Academy and take any Spartan flying course at the same time at the Will Rogers Airport in Claremore. An outstanding school maintained by the State of Oklahoma with U. S. Army instructors and unsurpassed faculty. Senior units of Infantry, Cavalry and Aviation. Complete units of Ordnance and Artillery of the Oklahoma National Guard. All sports and recreation including football, polo and boxing.

Now you can go to O. M. A., complete two years of college, and qualify for Transport Pilot's License all at the same time and at less cost than for school work alone in most private schools. If interested in combined School or College and Aviation Courses, write direct to—Aeronautical Department, Oklahoma Military Academy, Claremore, Oklahoma, Col. Walter E. Downs, President.

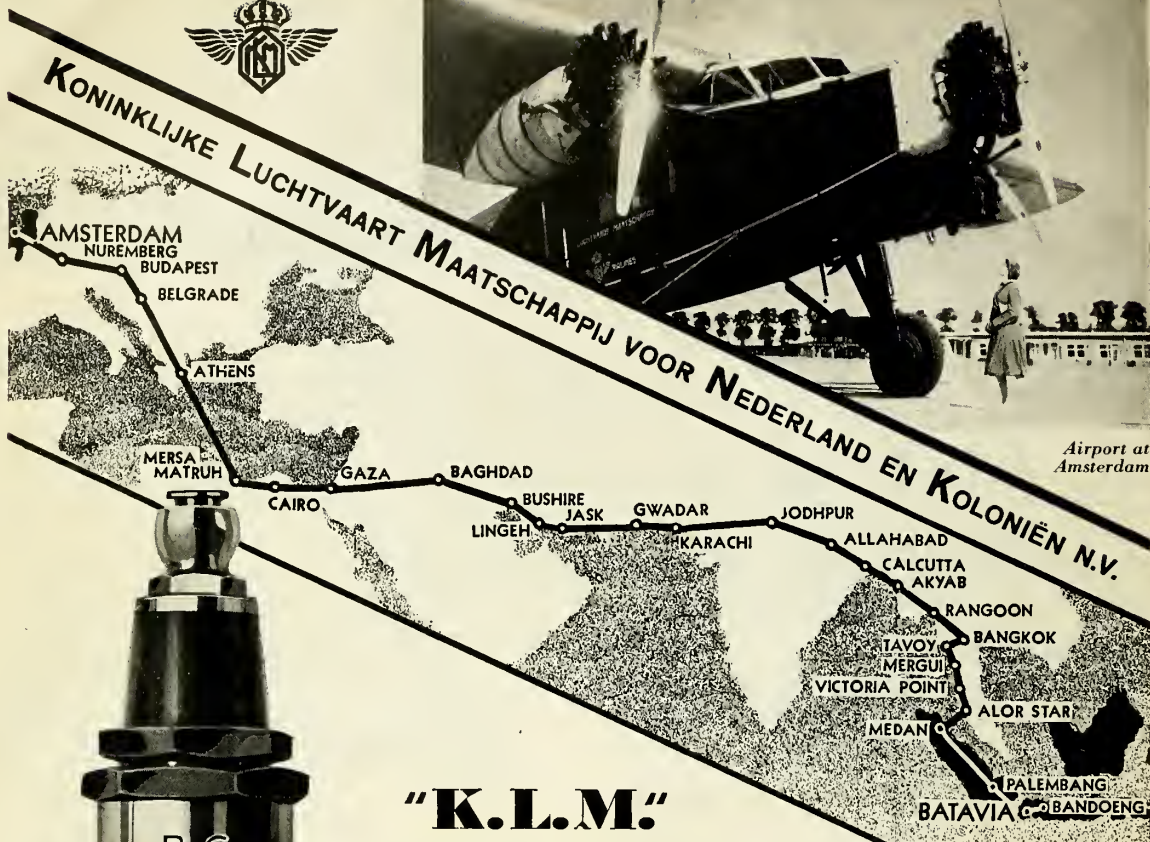
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Temperatures on these flights vary from extreme cold to excessive heat. Perfect spark plug performance under such temperature changes is necessary to the safety of passengers and crew. Naturally, therefore, B. G. Mica Aviation Spark Plugs are used as standard equipment by "K.L.M."

"Over there" or over here—everywhere in the world that planes are flown—B.G.'s are recognized as the spark plugs that give absolute satisfaction under every flying condition.

*B. G. Mica Aviation Spark Plugs are patented in the United States and other countries.*

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WOULD you like to fly? Do you go to the airport every Sunday . . . struggle for a point of vantage . . . inhale clouds of dust . . . and squint your eyes while watching some more fortunate individual soar around in the vast expanses of the air above?

Yes, you would like to be up there, too! Here is a real recreation . . . recreation far beyond the pleasures of earthbound games; vastly more exhilarating than golf, tennis, baseball or seashore fun; and infinitely more satisfying than even the fastest motor boat. Instead of spending your Sunday afternoons watching . . . you would like to spend these same Sundays—and quite a few week-days—flying. There have been just two things keeping you from it . . . cost and fear. And, with an Aeronca, these obstacles are more imaginary than real.

As far as fear is concerned, it is only necessary to take one ride—to fully realize that no airplane built today could be any safer. The inherent stability of the ship, its total lack of tricky characteristics, its short take-off and slow landing, its amazing ability to right itself into normal flight position whenever the controls are released, have built up a record for safety that is without a parallel.

And, when it comes to cost, the initial price plus the exceptionally long life actually make it possible to figure as low as one dollar an hour for depreciation in usage. Compare this with an automobile. How many cars will last for 120,000 miles? And is there any car which can cover 75 miles in one hour on 2½ gallons of gasoline? The total cost for an hour of Aeronca flying is less than \$2.00 even when

maintenance, depreciation, gas and oil are included. If you spent \$5.00 each week for flying you could enjoy 130 hours of it in a year . . . nearly 10,000 miles.

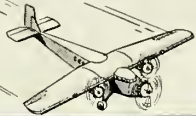
If you can't afford the \$1730 for a two-place Aeronca Collegian, equipped with air wheels and oleo landing gear, why not start a club in your town? With 10 members, the cost would be about \$175.00 apiece . . . with 20, about \$86.00. Most any pilot will teach you how to fly an Aeronca for \$15.00 because you'll need only five hours training or less. And, from then on, mankind's most fascinating recreation is yours to enjoy . . . either alone or with some congenial companion . . . at less than a dollar an hour for actual operation. Aeronautical Corporation of America . . . Lunken Airport . . . Cincinnati, Ohio.

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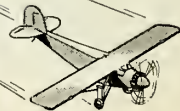
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THOROUGHbred

The REARWIN, Jr.

OF ITS CLASS



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They kept our demonstrator busy from morning until dark. In the air they found what words could not describe — keen performance,

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*The Rearwin Jr. was designed to meet the requirements of a three-point market—the businessman, sportsman pilot and flying school operator. Get in touch with us now for territorial assignments.*

inherent stability, snappy take-off, short landings and all the other qualities that make the Rearwin Jr. the thoroughbred of its class.

The Rearwin Jr. carries A.T.C. No. 434. It is priced from \$1795 up. Power equipment available, the Aeromarine 50 h.p., the Jacobs 55 h.p., or the Szekely 45 or 50 h.p. A detachable winter enclosure may be had at slight additional cost.

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# BEARWIN AIRPLANES, Incorporated

FAIRFAX AIRPORT, KANSAS CITY, KANSAS

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You wear only the harness.  
The seat cushion is your Chute.



Click! Click!! Only two seconds  
to snap the quick-connectors. . . .



. . . and your Switlik Safety  
Chute is ready for you to use.

SHOWN for the first time at the Aircraft Show last month, Switlik's new *Quick-Attachable* Safety Chutes registered 100% satisfaction. Pilots expressed unprecedented interest in this new idea in parachute design. ¶As the illustrations show, you wear only the harness. Your back or seat cushion is the standard Switlik Safety Chute. In case of emergency, two swift movements will fasten both attachment clips. The entire operation consumes but two seconds. ¶The Switlik *Quick-Attachable* Safety Chute is an advance over other similar types in that it opens up and over the back, thus eliminating the danger of injury to the face from the many parts during opening. It is standard throughout—harness, pack, rip cord, four-point suspension, operation, etc. ¶Switlik Safety Chute owners will be interested to know that their present type may be converted to the new *Quick-Attachable* Back or Seat Pack Style at a very nominal cost. A letter will bring, promptly, complete information and prices concerning this conversion.

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Broad and Dye Streets

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### New Low Prices

#### WHITE SILK

Including *Quick-Attachable*  
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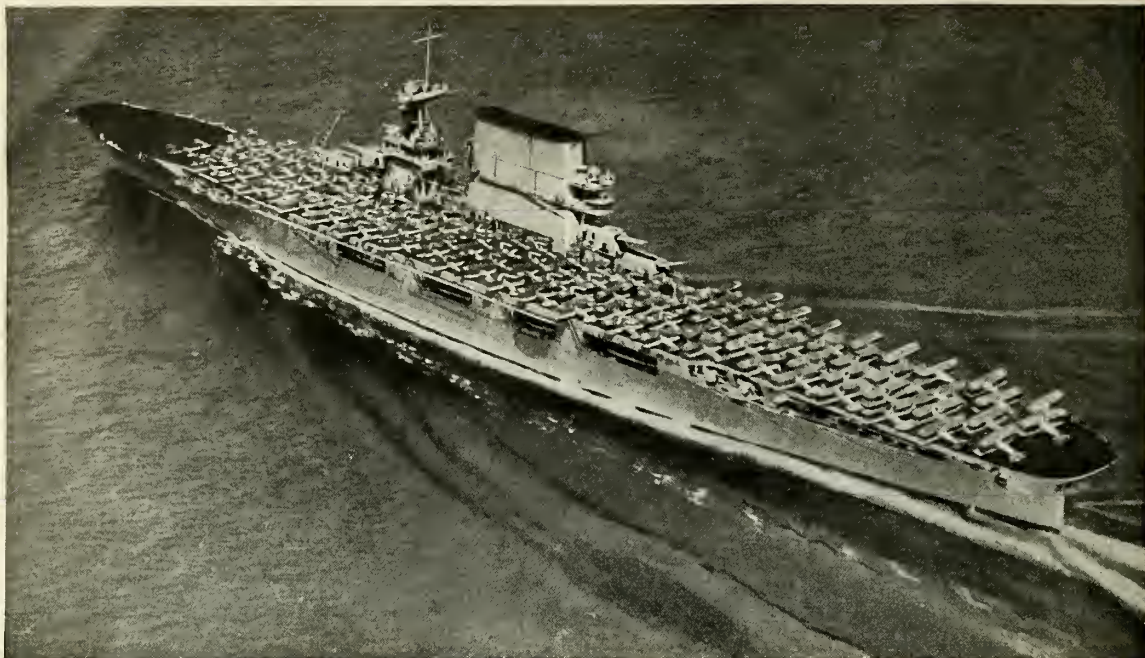
(Former prices, \$300 and \$325)

#### PONGEE SILK

### \$225

(Former prices, \$240 and \$265)

With these drastic price reductions you can buy an All White Silk *Quick-Attachable* Safety Chute now for less than the former cost of a Pongee Chute.



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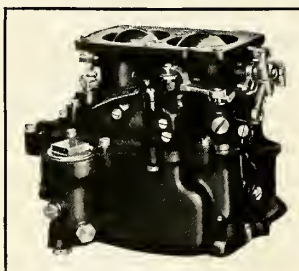
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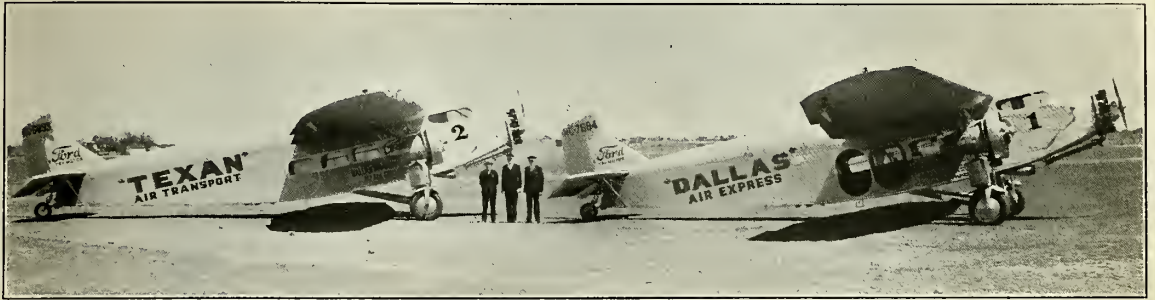
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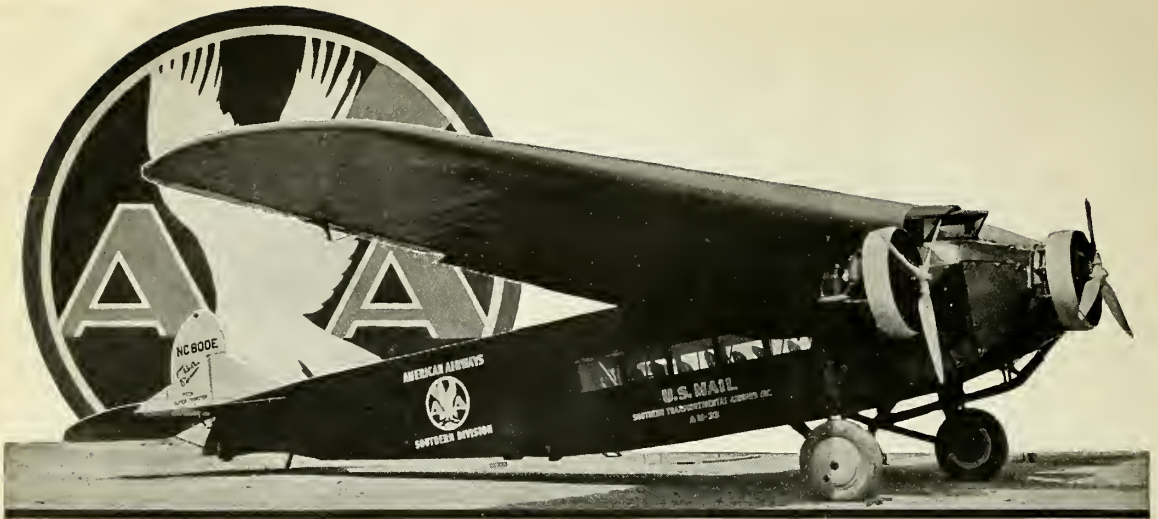
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# AERO DIGEST

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Vol. 20 MAY No. 5

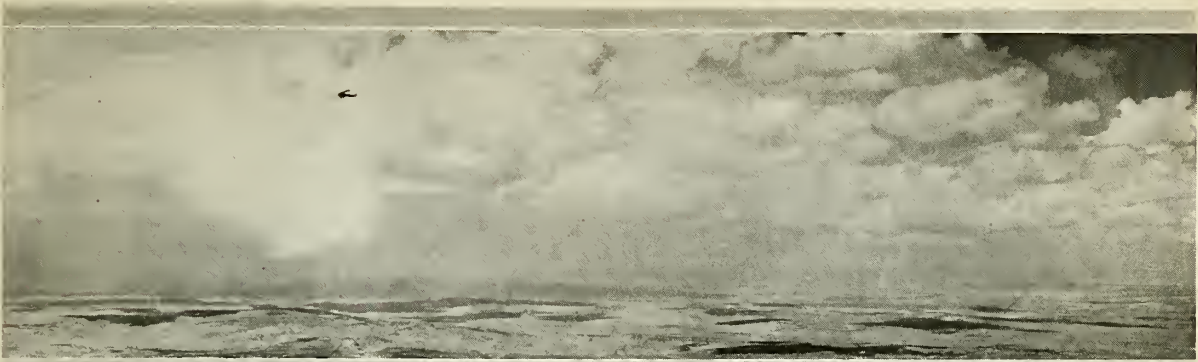
*Cover Design: Three Waco's—the Model C Cabin and F-2 in flight, and the Model A Convertible on the ground.*

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## GIVE THOSE BLUES THE AIR

*by Caldwell*

**W**ONDER what's got into me, anyhow. I feel an urge, unusual at my time of life, to go places and do things. Of course, it may simply be spring, or it may be that I am entering my second childhood; or perhaps it is the cumulative effects of the cod liver oil I've been swigging all winter. But I really think that my spring impulses are a rolling-stone heritage from my grandfather, Cadwallader Caldwell—Old Flat-wheel, as he was known to his intimates.

Dear old granpappy was a great traveler. He didn't do much of it during the winter months, as the railroad companies don't heat box cars, but along in April when the sap was flowing in the trees and all hands were needed on the farm, we'd wake up some morning to discover that granpappy had folded his tent like an Arab or a defeated political candidate, and silently stolen away. Which is a poetic way of saying that he'd sneaked down to the water tank and pulled his freight out of there.

I wonder if this restlessness of mine isn't handed to me by old Cadwallader, the Lowell Thomas of the Caldwell clan. Every year at this time I feel the same urges and quiet them only by moving.

Well, there's one cheerful ray of light amid the encircling gloom: Along with butter, eggs, and stock dividends the passenger rates on airlines have dropped to a point where anyone who can afford rail and Pullman charges can travel by air instead. In some instances the charges are lower than for rail and Pullman. Why, they've got rates so low that Scotchmen are flying. In fact, I expect the airlines to capture the entire traveling Scotch trade soon as it gets noised abroad that in the air you save tips to Pullman porters and dining car waiters.

I've heard people say, "I'd like to go some place by air, only it's too expensive." It isn't any more. If you can afford it by Pullman you can afford it by air. Speaking of Pullmans reminds me that railroad officials estimate that at least ninety out of every 100 people in the United States today never have ridden in a Pullman car. So you

see the Pullman depends for its patronage on only ten per cent of the traveling public and does very well on it. Sometimes I get out a few shares of railroad stock I own, and cry softly over them until the certificate is soggy—it's sure enough watered stock. The way I figure it, the airlines are going to get most of the Pullman passengers and the bus lines are going to collect half of those in the day coaches.

You know, they talk about "the good old days," meaning the days of the stage coach, when life was unhurried, unfurried, and peaceful. Well, if I can believe the label on a bottle of real Scotch whisky I bought in Canada, travel in the good old days was just a lot of suffering; here's the copy of an old stage coach advertisement the label carried: "All that are desirous to pass from Edinburgh to London, or any other place on their road, let them repair to the WHITE HORSE CELLAR, in Edinburgh, at which place they may be received in a STAGE COACH every Monday and Friday, which performs the whole journey in eight days (if God permits), and sets forth at five in the morning. Allowing each passenger 14 pounds weight, and all above, 6 pence per pound. February, 1754."

That eight-day journey from Edinburgh to London (God permitting) could be knocked off in less than two hours by a fast airplane. The stage coach trip of 1754 cost the traveler about three times as much as it would cost him to make the same distance today by air. Don't forget the old boy had to eat and sleep for eight days, between stages, not to mention the possibility of Robin Hood meeting him on the turnpike and forcing him to stand and deliver. No, those journeys of the good old days are great to read about in Charles Dickens' novels, but they must have been hard on the plus fours.

Despite which, when the trains came along a lot of people refused to ride in the new-fangled contraptions and stuck to the stage, just as many people today stick to the train. They're the same kind of people in both instances, very

cautious and conservative and, unlike a time table, not subject to change without notice—and possibly a major operation.

However, there are quite enough of the more modern and speed-demanding type of human to make good business for the airlines, once people learn that air travel can save them time at little or no extra cost. Consider, for example, a man from California who has come to New York to make his fortune on the stock market. Well, he buys stocks and they all go up—of course, I'm supposing that we've had a change of government in the meantime—and he says to himself, "Well, now that I've made a fortune on stocks, as so many have been doing the last year or so, I shall go back to California. California, here I come!" So he calls up a railroad ticket office and learns they'll deliver him out there in five days. But he also calls Transcontinental & Western Air, Inc., and learns that they'll set him down in Los Angeles on the evening of the second day, if he doesn't mind sleeping one night in Kansas City. Or he calls United Air Lines and discovers that they'll ship him out to San Francisco to arrive at 1:45 next afternoon, if he is willing to sit up all night. As he's a Native Son, he's game for anything, so away he goes by air and has three whole days extra to spend in California, when by train they'd have been practically wasted looking at telegraph poles. To a Californian this is a gain of three clear days of life, because a Californian doesn't figure he's even existing in any other State—he's just in a waiting period, that's all.

Even today, airline publicity and advertising have made the public so conscious, at least in a general way, of the time-saving element of air travel that the greater majority of them, faced suddenly with the need to get to some place quickly, will think of the air first and the train afterward, if at all.

However, advertising the benefits of speed is a hard job in a country that just now is sitting down waiting to catch up with itself because it went too fast in 1929. Now that the spring itch is attacking the multitudes as it is attacking me—confound it!—the thing to do to boost air travel, help the airlines, and hence help all of aviation directly or indirectly, is to point out to *hoi polloi* the other benefits to be derived from the act of severing relations with the ground and going some place by air. I suggest here that everyone concerned with or interested in the advancement of aviation give himself the unofficial job of trying to sell some one or more persons on these other benefits that he may derive from a trip on an airline. Probably ten million people are going some place for their vacations—why not try to induce some of them to go by air? Not only because they save time, but because the experience itself is worth far more than its cost.

In the first place, if you haven't flown some distance your social standing is practically nil. This dictum applies especially to the younger set, who can't bear to be considered back numbers, even if they actually are. I found this out the other evening when I attended a party given by people having no connection with aviation—they were all very respectable people—and a young man there happened to remark that he'd just returned from Los Angeles by air. A young girl took it up and asked a few questions; he answered, elaborating a trifle here and there. Another girl asked him something, and an ancient dowager horned in with a few words marveling at his courage. By this time he was cashing in on that tame trip to such

an extent that you'd have thought he had taken in both Poles, at least. A fellow who had voyaged down the Atlantic Coast in a catboat tried to head him off, but he and his catboat were tossed into the discard with a few polite murmurs of, "Oh,—yes?" Catboats, apparently, were low. Then a man who had shot lions in Africa dragged a couple of lions into the argument, but out he went, lions and all, while the air traveler flew us across a continent and landed us in a rain at Newark. Then somebody happened to recall that I had flown somewhere, some time or other, but I merely admitted that I'd once flown from Roosevelt Field to Valley Stream, and let it go at that. Who was I to steal that young man's thunder?

But speed, after all, is what we have to sell to the traveling public. And think what we can offer the vacationist in that line! Consider, for example, the man who by train has time only to go so far as Chicago to listen to the traffic cops whistle like birds; on an airline he can stretch his glide to reach the Grand Canyon, the greatest spot in the world to dump old used cars and dry Congressmen. And a fellow who has been hearing about depression for two years should see the Grand Canyon and observe what Nature can do in that line. It's the biggest depression in the United States, outside of Philadelphia on Sunday.

Now there's another thing I want you six readers to drive home to chaps who might be induced to take an air vacation this year. There's no depression up in the air; or if there is, you carried it with you in your own mind. If you take an air journey in the right spirit—and whether your state of mind is healthy or not is up to you—you should be able to leave behind the humdrum thoughts you house here on the ground and get a new set of slightly brighter, cleaner, fresher thoughts as you sail along through the air. That's not sentimentalism; it's plain common sense. Thoughtful folk can't feel happy when there is so much misery and worry and unhappiness all about them, even if their own personal affairs are tolerable. But just the same, if you can do so it is well to get away from it for a time, even if it's only for a little time.

If every person in the United States who could afford a vacation could just get aboard an airliner and go some place in this country, and get a good look at it, the mental house-cleaning our citizens would receive would go farther to lift this depression than all the political measures in Washington. We'd have a crowd of people who would come back to work not only believing vaguely but actually knowing from the evidence of their own eyes that we have a great country here. A great country, folks; perhaps the finest any people have fallen heir to. Never mind the stupid and morally dishonest politicians, the gangsters, the racketeers, the fanatics, the grafters, petty and big, the corrupt public officials—such scum floats to the top, but sooner or later floats away and is forgotten. Always the country remains, the land, the forests, the minerals in the earth. The country lacks nothing; only we people who live in it lack. And the fault is ours, collectively and individually. We do faulty work, faulty thinking, faulty banking, faulty speculating, faulty law-making—and then whine that the country is going to hell!

What we need to do, the whole stupid, blundering lot of us, is to get up in the air and take a good comprehensive survey of this fine land of ours, and then stop selling it short and stop frantically trying to give it away to each other.

# MORE AIRCRAFT CARRIERS NEEDED

Major General James E. Fechet, U. S. Army (Ret.)

AS one more annual practice period of the combined fleets of the United States Navy comes to a close, we are again appalled by the gaping holes which have been allowed to develop in the newer and what should be the most powerful division of our First Line of Defense. Every country has two First Lines of Defense, where formerly there was only one, the Navy. The new line is Air Power operating with the fleet.

The combined Atlantic and Pacific fleets, weakened as they are by treaty conditions, and dwarfed even below those treaty conditions by a false sense of national economy, went out on the Pacific this year for their annual practice period. They went there because every recognized military authority who has expressed a sound opinion in the last ten years has agreed that the broad expanses of that ocean will be the scene of the next major engagement of armed forces afloat.

The United States Naval forces have gone out on this scene to rehearse a number of routine and fundamental steps of this inevitable conflict. The fact that they have taken this opportunity to rehearse and to display the best of which the Navy is capable is perhaps the best insurance which we have that that conflict may yet be postponed a little while. The time has come for the American people to realize that if that rehearsal could be perfect, and the weapon rehearsed with the best in the world (which it most certainly is not), our enemies, looking on, might realize the advantages of postponing the real thing forever.

All the reports on the movements of the fleet over broad expanses of the Pacific are not yet in, but, as the war games proceeded, the same failure has appeared again which has appeared in all of the previous practice periods. There are enormous holes today in the new First Line of Defense—holes through which a first-class air power of the world could push an overwhelming force of flying gun strength and which the United States would be powerless to repel.

The reason that modern military tactics require placing air power with the fleet is because of the indisputable fact that the only way to oppose hostile air forces arriving by sea is with fighting aircraft based at sea. This is done through the medium of the aircraft carrier.

An aircraft carrier is in reality a floating airport. The larger types are capable of handling efficiently about seventy-five fighting planes, divided between the pursuit, scouting and bombing types.

In the Pacific maneuvers we found the United States with only two of these modern, first-class floating airports. They are the *Lexington* and the *Saratoga*.

If Great Britain were carrying out the present maneuver problems in the Pacific, there would be available the following: *Hermes*, *Eagle*, *Argus*, *Furious*, *Courageous* and *Glorious*.

And if it were Japan, there would be *Akagi*, *Kaga*, *Hosho* and *Ryujo*.

This superior strength speaks for itself. In undertaking to interpret the lessons taught by the maneuvers in the Pacific, where obviously a superior air force at sea could

pour through our own weak two-aircraft-carrier defense and raze our coastal strongholds, destroy non-combatant populations and cripple our secondary defenses, I have called for a review of the lessons taught in previous annual fleet maneuvers. In all of these sea war games victory has always gone to the side which possessed the superior air power.

To my fellow citizens to whom I try from time to time to give a picture and impression of how remarkable a modern aircraft carrier is, I am invariably turned back by the astounding fact that we have only two of these ships in the first class. The *Langley*, it must be remembered, is a purely experimental ship and would be of no value whatever in actual warfare.

It is natural that the question should be asked, "If these ships are so remarkable why do we possess only two of them?" Under the provisions of the London Naval Treaty, Great Britain and the United States are allowed 135,000 tons of modern aircraft carriers; Japan, 81,000 tons.

We have built (in addition to the experimental *Langley*) but two carriers, the *Lexington* and the *Saratoga* of 33,000 tons each. One more carrier, the *Ranger*, is on the ways and will utilize 13,800 additional tons in this category. We are thus permitted to build 55,200 tons more, up to the imposed limit of 135,000 tons.

We have utilized 66,000 tons in building two vessels; the British have used about 45,000 in building their two most recent ones. Since the Treaty prohibits the replacement of these vessels until after twenty years from the date of completion, it is evident that Great Britain has at least what we call "paper superiority" over us during the life of the Treaty in number of aircraft carriers, by virtue of the difference between 66,000 and only 45,000. In other words, England can build an additional carrier of 19,000 tons, giving her three carriers to our two in the utilization of 66,000 tons of the allowed quota.

As a matter of fact, England has in actual service five excellent modern carriers (not including one old carrier) capable of operation with the fleet, although three of these are experimental and may be replaced at will. She may construct two more, retaining all five of her present craft without surpassing her Treaty limit and thus have seven in operation.

We can, by scrapping the *Langley*, build three more aircraft carriers to a total of six, but this leaves us in the inferior ratio of six to England's seven. Japan has built almost to her limit allowed and has four carriers.

I urge the American people to keep two things in mind in casting back over these tonnage figures and the resultant ratios. First, if the military authorities of the world did not recognize how important these ships are, we could rest assured that the allowed totals finally agreed upon would not be so small. Imagine a weapon so powerful that the military experts of all the first powers of the world agree that three, four, five or six of these, at the most, are enough for any one nation!

Second, bear in mind this fact: We have come out on the short end of the ratio for one reason alone. Of all the

(Continued on page 98)

# EDITORIALS

## Why Not Try The "Airgram"?

THE suggestion of A. L. Rushton of Omaha, that the Post Office Department encourage the use of air mail by the issuance of Airgrams, is worthy of a trial or at least of a careful study and analysis. Simply shelving the suggestion, as apparently has been done, does not satisfactorily dispose of it, nor lead the aviation industry to believe that the Post Office Department has devoted more than casual thought to the matter of a popular-price air mail service.

Briefly, Mr. Rushton's suggestion is that the Post Office issue a single-fold letter envelope combination, eight by eight inches, with perforated and gummed margin for sealing, with embossed air mail stamp, at a price of three or four cents each—preferably three cents. This Airgram, within which a 250-word letter could be written, would correspond to the postcard of ordinary train mail.

An average air mail letter weighs three-quarters of an ounce and costs the Government fourteen cents to carry, for which it receives only five cents. This light-weight letter-envelope, or Airgram, large enough for ninety per cent of business correspondence without enclosures, weighs eight to the ounce, brings in twenty-four or thirty-two cents per ounce, as the case may be, in revenue from stamps at either three cents or four cents, and obviously would be profitable where regular five-cent air mail is unprofitable.

The Post Office Department and the mail contractors should give careful consideration to the opportunities presented in this plan. It seems logical to have the mail conform to conditions imposed by the most up-to-date method of transportation in order to secure the highest efficiency.

In June, 1928, when the air mail rate was dropped from ten cents to five cents, the poundage more than doubled in the next six months. Is it not possible that this added air mail service at a lower rate would show an equally large increase in poundage?

## Let Our Airships Lead

IT is heartening to see the depth of approving interest that has greeted the definite steps toward the Government's making possible the inauguration within a few years of a regular trans-Atlantic airship line. Not a voice has yet been raised, even in these times of timidity respecting new ventures involving public expenditures, against the bill of Representative Cresser of Cleveland (H.R. 8681) authorizing the Post Office Department to award contracts for transporting mail across the Atlantic by lighter-than-air craft. The similar Bill of Senator McNary of Oregon already has been favorably reported by a subcommittee of the Senate Committee on Commerce.

That America may lead in this establishment is apparently the fervent wish of the public, following a most interesting exposition of the plans and prospects made by

representatives of the Goodyear-Zeppelin company in hearings before the House Committee on Interstate Commerce, of which Representative Rayburn of Texas is Chairman.

Controversial discussion gave way completely in these committee hearings before the force of impressive facts, authoritatively placed upon the record by men who have expended large sums of money, unlimited time and patience in the scientific research and experimentation essential to this pioneering. The Goodyear organization has richly earned the utmost commendation for its great work. Now it is little indeed that is asked of the Government to make possible the next forward step of realization by contracting to send the highest class mail overseas by dirigibles that will make twice the speed of the fastest ocean liners and nearly four times that of the average surface ship. The studies, made with extraordinary thoroughness by the experts of America in co-operation with able scientists of Germany and England, assure regular trans-Atlantic crossings in two and a half days by dirigibles larger than the new Navy dirigible *Akron*, capable of carrying eighty passengers comfortably.

It will require three years to build these mammoth airships, so the delay in making a start caused by failure of Congress to pass the McNary-Parker bill at the last session should not be extended longer.

Admitting that the operation of the transoceanic passenger airline would be a gamble from a financial standpoint, President Paul W. Litchfield and Vice President J. C. Hunsaker of the Goodyear and Zeppelin interests testified their international forces are prepared to carry out the enterprise in every particular if the Government grants the mail-carrying contract, by which the service may have a reasonable prospect of becoming self-supporting.

The mail contract sought to be authorized for bidding, it is estimated, will yield \$6,300,000 per year. On a per-mile basis it amounts to \$17.50, or \$5.50 more than is now paid merchant vessels. The actual cost of each airship crossing has been figured to range from \$83,000 at the beginning down to \$70,000. If an average of forty passengers can be carried at \$750 each this will make possible the earning of a margin of profit.

We believe that the enterprising pioneers in the building of dirigibles in America have the earnest good wishes of the whole nation and that their establishment of such transoceanic service will be of tremendous public benefit in enlarging our international trade as well as furnishing a facility for air travel of epochal importance.

It is a highly significant good omen for the entire cause of aeronautics that in placing the case of the proposed overseas dirigible line before Congress there was complete unity in endorsement. Leaders of the Commerce, Army and Navy Departments' aeronautical branches joined with civilian scientists and business men of the industry in commending the immediate release of Government support for the venture.

The Congressional hearings have shown that all the exhaustive preliminary work has been well done. It has been laid out frankly and fully and has aroused exceptional interest and enthusiasm in the public. Now, the way to proceed is to keep on going.

This country is in an exceptionally advantageous position through its practical monopoly of helium, the wonderful non-inflammable lifting gas of which vast supplies are available in Texas and for which search in foreign countries thus far has been in vain.



# AIRWAYS OF JAPAN

H. Takamatsu

*Aero Digest's Correspondent in Japan*

ONLY about ten years have passed since air transportation was started in Japan, and scheduled commercial air transportation has had an even more recent beginning. Even now the total length of Japanese airways is only about 3,000 kilometers, or about 1,864 miles.

One of the first private Japanese organizations to employ aviation, the Asahi newspaper office, has used several airplanes for about ten years for the transportation of news and photographs between Osaka and Tokio or between Sendai and Tokio. It also has transported mail and passengers and tried to popularize a knowledge of aerial flight. A local air transportation company, using Osaka as a center, was developed in June, 1922.

In those times, covering the distance of about 425 kilometers between Tokio and Osaka took three or four hours, and only two or three flights were made in a week. Moreover, rapid atmospheric changes caused frequent interruptions of service, and the machines used were old and poor. Following the addition of three Dornier Comet planes, made by the Kawasaki Dock Yard, the Asahi enterprise of air transportation proceeded under better conditions.

### Establishment of Chief Airline

As a result of reports of the long-distance flights of English, German and French aviators to the Far East, aviation fields were constructed and commercial airways between Tokio and Osaka were established. The Government founded a civil air transportation corporation with capital of ten million yen in October, 1928. This corporation, the Japan Air Transport Co., Ltd., took over the Asahi air passenger transportation in April, 1929, marking the opening of the first important Japanese airline, nineteen years after the first flight in Japan. During the first three months of operations only the mails and cargoes were carried, but passenger transportation was begun in July. The development of the airways in Japan was encouraged by the progress of airlines in America and Europe.

The main airway in Japan, operated by the Japan Air Transport Co., was opened, with headquarters at Tokio, running from the northern provinces to the southern islands. The main route is the airway of about 930 kilometers between Tokio and Fukuoka, passing through Osaka. The airway then crosses the Strait of Korea and reaches Dairen in Kwantung Province, passing over Urusan, Keijo and Heijo in Korea. The airline, which is the only important main route in Japan, extends about 2,000 kilometers.

Two flights are made every day between Tokio and Osaka, and along the remainder of the route one flight is flown daily. The planes in use include Fokker Super-Universal passenger planes, imported mostly at the time of the founding of the company. The newer planes have all parts made in Japan.

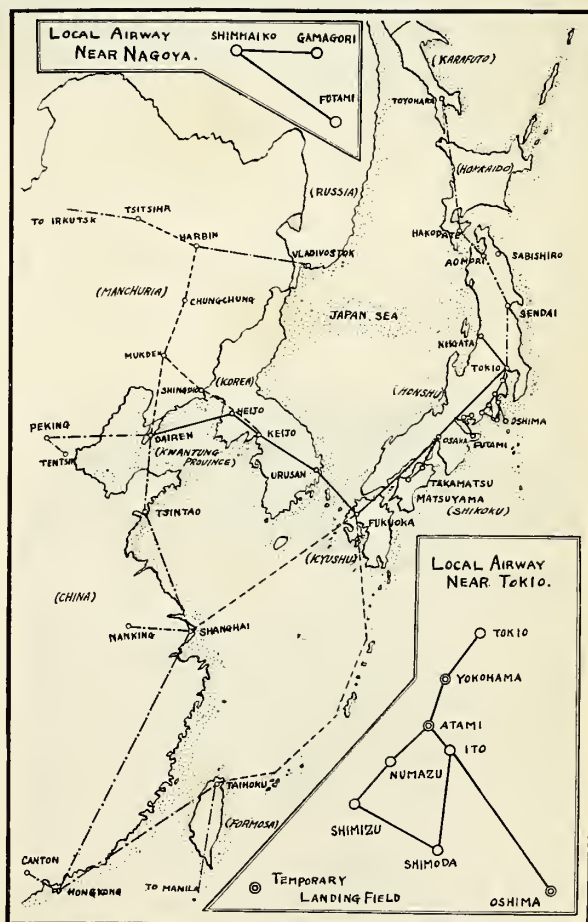
A local airway covers the Izu Peninsula, its route proceeding from Tokio over Yokohama, Atami, Ito, Shimoda, Oshima, Shimizu and Numazu. Although an important line, it is only about 200 kilometers long. It is operated three times weekly by Tokio Air Transport & Co. and was established in September, 1928, with a capital of 200,000 yen.

Near Osaka there is a 290-kilometer local airway operated by the Japan Air Transport Laboratory. The route connects Honshu and Shikoku, reaching Takamatsu, Matsuyama and Osaka. This airway, established in June, 1922, with a capital of 500,000 yen, is the oldest commercial airway in Japan.

An airline is operated by the Ando Flying Laboratory near Nagoya, a central city of Japan. This route starts from Shimmako and goes to Gamagori and Futami, distances of about 180 kilometers. The airway is located between Tokio and Osaka. It is operated for only three months, from July to September, every year, only one flight being made weekly.

An air mail route between Tokio and Niigata is flown by several airplanes belonging to the Asahi newspaper office. Flying on this line was begun in August, 1928. It is expected that this will grow into a passenger airway, connecting the Pacific and Japan Sea coasts of Japan in the near future.

*(Continued on page 100)*



Map of Japanese Airways. Full lines show actual routes, dash line projected airways, and dot-dash line future routes

# METAL AIRPLANE CONSTRUCTION

## Part 2—Body and Tail Groups

By

Dr. Michael Watter

**P**ART 1 of this article reviewed the general considerations one must take into account in metal construction, and the most efficient types of metal wing design were discussed. Mention was made of the fact that any design is necessarily a compromise between purely structural and practical considerations, the latter being dependent upon the manufacturing facilities, maintenance, operating conditions and number of airplanes to be produced.

In view of the cost of dies, jigs and fixtures, necessity for interchangeability, etc., the question of the number of units to be produced is of greatest importance in the matter of design, unless the cost is of secondary consideration. This part of the article deals with the subject of fuselage, tail surfaces and landing gear design, which in its fundamentals follows the principles discussed in Part 1.

### Fuselage

The design conditions governing the structural requirements of the fuselage are numerous; they include flying, tail loading, landing and special conditions such as catapulting and arresting. It will be found in most cases that the design of the forward part of a fuselage will be governed

by flying, landing and special conditions while the rear part will depend on tail loading and three-point-landing conditions. In view of the depth-to-length ratio of the normal fuselage, frequent points of application of high concentrated loads and openings required, a truss type of construction may seem efficient for the purpose. This would be true if the fuselage were designed without regard to

good streamlining and with a minimum of cowling, but the weight of non-structural items (such as fairing, bulkheads, fairing strips, cockpit cowls, pans, etc.) increases the weight of the assembly to such an extent that a well-designed monocoque structure can (and does) effectively compete with a truss-type fuselage. This article deals only with general theoretical considerations

without regard to cost of production, equipment involved and difficulties of manufacture, which are the important factors in design.

The most popular truss fuselage is welded steel tube type made preferably from chrome-molybdenum tubing.

Those who do not favor welding will find a bolted or riveted duralumin truss-type fuselage lighter than chrome-molybdenum tubular steel, but even in that case the engine mount can be more efficiently made of steel because of

**METAL** has replaced wood in airplane construction as it has in other branches of engineering. This article is intended to present the variety of ways in which it is possible to use different types of metal construction and from general considerations to arrive at the suitable structure for a given purpose. It is worth repeating that a proper design, choice of material, nature of joining parts and other important points must be designed with due regard to the manufacturing facilities, maintenance and service conditions. In regard to the choice of material, it is the author's opinion that the efficiency of a structure is not so much a question of materials employed as the manner they are put to work by the designer.

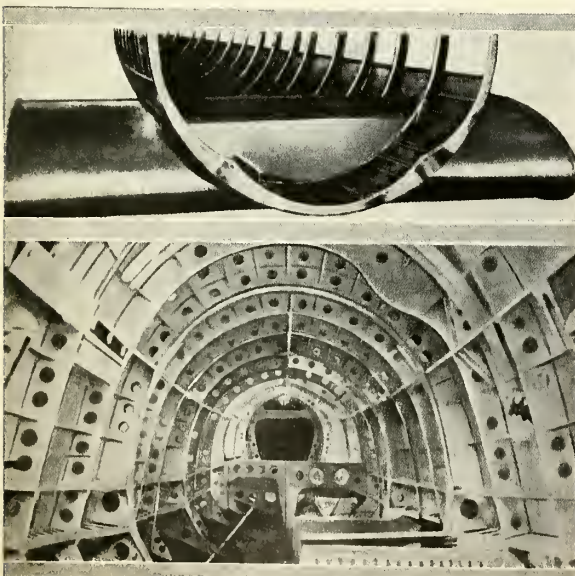


Illustration from Vickers Co.

Fig. 1. (top)—Lower half of Northrop monocoque fuselage; (bottom)—Hull construction of the Southampton flying boat

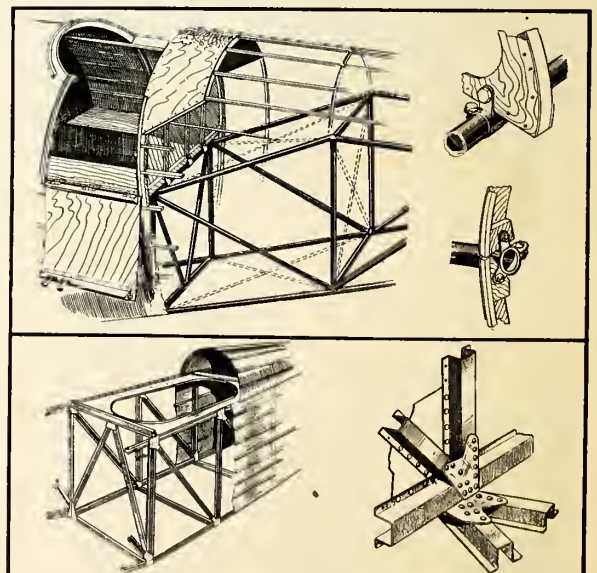


Illustration from Flight and Aeronautique

Fig. 2. (top)—Avro 631 "Cadet" fuselage of tubular steel; (bottom)—Potez reinforced box type fuselage construction

higher fatigue limit of the material, possible smaller sizes affording better accessibility and ease of manufacture. The truss type, however, is so well known and designers have settled on their personal preferences, that this brief mention of the truss-type fuselage will suffice. The monocoque and mixed designs are still debated upon and are worthy of a more extended discussion.

There are three principal types of monocoque to be considered: Pure, semi- and reinforced shell. The pure monocoque type designates a shell without any reinforcements; semi-monocoque is a shell with bulkheads, and the reinforced monocoque consists of a shell, bulkheads and longitudinal members or stringers. Sometimes the first two types are called "pure shell" while the last is classed under semi-monocoque construction. The reinforced monocoque then is referred to as shell with bulkheads, diagonal and longitudinal stringer reinforcements. The latter type is not in common use, as it presents many manufacturing difficulties. While the term "monocoque" is often loosely used to designate a type of structure consisting of an outside covering, contributing the major part of the strength of the assembly with proper reinforcements and with minimum transverse bracing, this word also definitely implies a round or oval shape. The flat-sided type of body, either with sharp or rounded corners, should more appropriately be classed as "box type," and in that case the provision of diagonal reinforcements does not present the difficulties to be met with in the conventional type monocoque construction.

The monocoque type, by virtue of its shape, combines favorably structural and aerodynamical advantages and affords more room within because of the concentration of structural reinforcements close to the outside surface of the shell. In addition, the absence of transverse bracing permits of easy access throughout the length of the body, thus facilitating inspection, repair, replacement of equipment, etc.

In all types of monocoque it is possible to use smooth or corrugated skin, and both these types are in evidence in modern construction. It is possible, however, to advance a strong argument in favor of smooth skin constructions from the manufacturing, structural and aerodynamical points of view. Before proceeding with this discussion, we will review some of the salient points in favor of and against the various types of shell design.

Inasmuch as the usual depth-to-length ratio of a fuselage is high and the loads acting result in comparatively small stresses, an efficient design necessitates

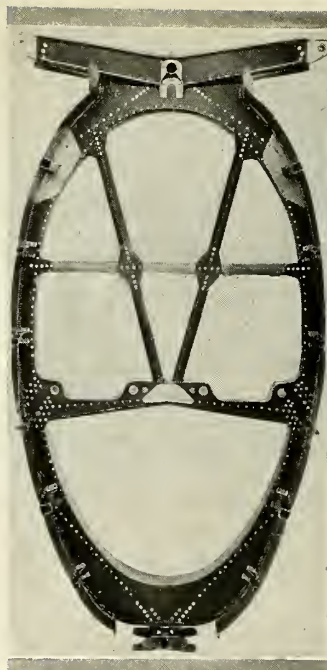


Fig. 3. Main bulkhead of a reinforced smooth skin monocoque fuselage

the adaptation of rather thin gauges of metal. This leads to construction which is impractical from the standpoint of ground handling and does not permit making the best use of the material because of the tendency of the light metal to crinkle and buckle. To prevent this it would be necessary to employ gauges heavier than actually necessary for purely structural requirements, and even then to obtain an efficient structure it would be necessary to use a variety of gauges to achieve a shell of approximately uniform strength. A semi-monocoque is better adapted for a more economic design although it would seem that much material is wasted because of uneven distribution of stress. This could be somewhat improved by the use of cover plates and strips of heavier gauge metal. The most practical and economic designs are, perhaps, the reinforced monocoque, since this type enables utilization of the metal to better advantage by proper spacing of longitudinals, leads to a stiffer assembly, which is more practical from the standpoint of ground handling, and gives a better opportunity to attach

equipment. The reinforced type of shell affords a more efficient means of designing places of high concentrated loads and is also better adapted to provide structure necessary for compensating for the weakening of the shell by openings and cut-outs.

Recent studies on the behavior of thin sheet structures indicate definitely that thinner gauges with more frequent reinforcements result in stronger, stiffer, yet lighter structures than are possible with heavier gauges and fewer reinforcements.

These facts emphasize still more strongly the advantages of the type of structure where use is made of thin metal shell, bulkheads and frequent longitudinals. The considerations of increased cost must be weighed with due regard to the fact that the closer spacing of longitudinals permits using narrower strips of skin, thus saving on the cost of forming and fitting.

Let us now consider the question of the use of smooth and corrugated skin in fuselage construction.

Aside from manufacturing difficulties, such as forming, splicing and bending, the use of corrugated skin imposes restrictions of shapes to be employed to a greater degree than in the case of a smooth skin. The fact that a corrugated skin is 20% heavier than the smooth skin in itself indicates that while the extra stiffness afforded by its use may be efficiently utilized in some places, as a whole it leads to an unnecessary increase in weight. It is also more difficult to obtain the same degrees of uniformity of structure by proper

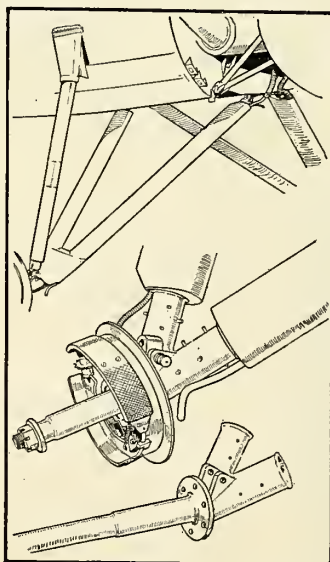


Illustration from *The Aeroplane*

Fig. 4. Avro 631 "Cadet" landing gear showing axle forging



Fig. 5. Brake-equipped spreader type landing gear

bulkhead and stringer distribution because of the limitations in the possible types of attachments. The general discussion presented above in favor of smooth skin reinforced monocoque is, however, individual, for there are structures in existence representative of all possible types.

Certain local or specific problems sometimes suggest a mixed type of design where truss and shell are employed, depending on not only structural but also service and maintenance problems. For example, engine mounts of the detachable type are preferable to the integrally designed type of mounts, and the tubular welded-up unit proves simple, efficient, light and accessible.

In some designs use has been made of the truss type of structure to house the fuel tank, provide rigidity and permit easy removal of tanks. This, however, can be accomplished as well in a monocoque design, provided the fuel tank compartment can be well vented and drained (an extremely important requirement) and also provided the filler neck design is such that there is no chance of spilling fuel inside the compartment. The tail skid or wheel installation should be outside the shell to facilitate inspection and repairs, and the attachments must have sufficient

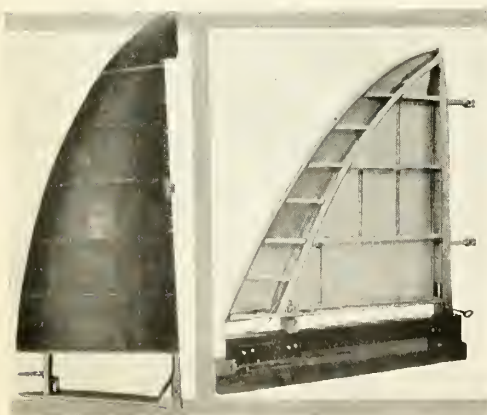


Fig. 6. All-metal stabilizer and fin structure

excess strength to preclude possible failure of adjacent shell structure. Such structures should be provided with rigid but easily removable fairings.

Figure 3 shows one of the main bulkheads of a reinforced smooth skin monocoque type fuselage. Four main and eight secondary channel type longitudinals are shown. The double H type bulkhead is reinforced by doubling plates on the skin at the attachment of wing strut fittings. The wing beam of a gull type structure is integrally designed with the bulkhead, in the upper center of which is built in a hoist sling fitting. The bulkhead structure provides support for rudder pedals, floor and fuel tank. In the lower center part is shown the main float fitting.

### Landing Gear

Landing gear design does not represent a new phase in the employment of metal, and its mention is made here only because the general considerations governing any other structure are equally valid in this particular case. From the standpoint of structural arrangement, landing gears offer a fertile field for mechanical ingenuity because of the complex problems of combined bending torsion, compression or tension which necessarily occur in chassis members. A considerable gain in structural simplicity and lightness can be achieved by proper eccentricities and arrangement of members.

Experience has shown that an effort should be made to have one highly stressed member, using the other parts of the structure as a means of bracing rather than requiring that they take any share of major stress.

The solution of statically indeterminate structure under combined bending and torsion is quite complex and it is advisable to design the fittings in such a way that a reasonable assumption as to the distribution of torsion and bending may be made in the beginning of the design. Once the first layout is completed, it is then possible to proceed with more careful calculation to determine the final sizes, necessary heat treatment and general strength requirements.

The spreader type landing gear designed by the author and shown in the accompanying photograph was developed with the aim of simplifying the axle fittings, usually complicated by brake torsion provision, and attaining an independent wheel movement despite the through spreader. The rear axle struts are rigidly attached to the axle sleeve. The stub axles on which are mounted the wheels are bolted to the sleeves. The rear axle struts take all bending and the greatest part of the torsion, serving also as bracing members of the structure. The shock-absorbing oleo legs, spreader and streamlined wires, the latter serving as cross-bracing, are all attached by universal joints. By proper eccentricities the bending and torsion are reduced in the axle struts and the resulting chassis structure is light and simple.

### Tail Surfaces

There are several tendencies in metal tail design, the preference being divided between corrugated and smooth covering. Control surfaces are often built of metal framework, fabric covered. For smaller ships this type of design gives lighter hinge movement and closer distance of center gravity of the surface front hinge line. The aerodynamical advantages of smooth covering should decide the preference for smooth covering. While the primary structure

(Continued on page 102)

# AIR—HOT AND OTHERWISE

## JEALOUSY IN THE RANKS



Frank A. Tichenor

THE concerted and vicious attack upon flying-time pay in the Navy, Army and Marine Corps, an attack which if successful must crush the service pride and patriotic ambitions of groups of men as able as any who ever did credit to the fighting forces of our nation, appears to be an organized effort on the part of non-flying military personnel to cripple aviation in our national defense plans.

A cause largely responsible for this might be resentful jealousy in the hearts of the non-fliers regarding the additional flying-time allowance made to aviators because of the risks which make the aviators' occupation extra hazardous.

Nobody questions the necessity for Governmental economy, but it first should lop off extravagances, obsolescences, non-essentials. It is madness to allow it to be used as the weapon with which to strike at the vigor of the one arm of our national defense which will be the first line of protection in case of an attack. The air arm which later inevitably must bear the brunt of fighting, will find in competition with it forces organized by other countries where statesmen are too wise to tolerate so harmful a procedure in the name of Economy.

Foreign nations, led by more intelligent and public-spirited men, having fresh in their minds what enemy aircraft *did* to their home countries during the recent war and aware of the greater havoc and slaughter which they will wreak in the next great struggle, take the enlightened stand that, in the face of the universal urge and necessity for economy, anything and everything else may be pruned down, but *air defense must not be*.

The triple reductions of pay for flying personnel of the Army, Navy, and Marine Corps, with the proposed slash of procurement funds to an extent which would make it impossible to maintain the flying strength of the squadrons, would be a greater blow to the safety of the United States than any foreign foe ever has even threatened. These services are among the few things which even the budget reductions never should have touched.

They did touch them to the extent of millions of dollars. That was bad enough; and now comes the House Committee, made up of members who apparently fail to realize the foolishness of the course they advocate, lopping off further sums.

Thus not only would they do the injustice of denying to the men who take the extra hazards (and often suffer from them) the extra pay which every other country allows, but would deprive the nation of that security which can come only from the possession of advanced, up-to-date equipment.

By thus depriving the country of protective weapons of the utmost importance, this proposed insanity strikes at the aircraft industry a bitter blow, adding a new threat to the many which the period of depression has made against its reasonable prosperity. The preservation of our

aircraft industry is essential to our national safety.

Flight pay already has been reduced since the World War. Originally it consisted of fifty per cent of pay and allowances. It now is fifty per cent of base pay alone.

The two men who are best qualified to judge the magnitude of the injustice proposed against our fliers are Major General Benjamin D. Foulois and Admiral Moffett. Neither hesitates to speak his mind upon the subject of this grim attack upon the efficiency of America's aerial defense.

"The extra compensation for the hazards of flying is deserved and has helped us to build aviation to a high standard of excellence," says Admiral Moffett. "The equalization of material naval strength by treaty means that we must look to personnel for our superiority. I think we have it now and that to sacrifice it by decrease of morale, in order to effect a small money saving, would be exceedingly bad judgment. Our aviation now is firmly founded. Why should we now do anything to upset and undo that which we have so laboriously built up?"

Admiral Moffett has significant statistics which Congress very appropriately might study. Flight pay is a very reasonable reward for extra hazards. In 1925 the Morrow Board considered the question carefully and in view of these extra hazards recommended "that the principle of flight pay should be recognized as permanent in time of peace."

Statistics for five years (1926-30) show that the average annual death rate of naval aviators killed in aviation accidents was 21.34 per thousand. A similar average accidental death rate for all officers excluding aviators was for the same period 0.71 per thousand. Thus the accident hazard of the aviator was thirty times as great as that of his brother officers.

If Congress feels that it must do away with something in connection with aeronautics in order to line up with the general economy drive, let it eliminate the National Advisory Committee, which costs over a million a year yet does nothing that is useful. The salaries of the Victors and Lewises and others of their ilk could be lopped off without a particle of harm to the national defense.

The mere proposal that the two Assistant Secretaries of War and Navy for Aeronautics should be eliminated as a means of saving money is positive proof of the jealousy at which I have hinted. This whole campaign of suggested false economy is one more effort at conspiracy of the old-timers in their jealous efforts to hamper the new arm of defense. One can imagine the unholy joy with which they have discovered a new road of attack.

But we of AERO DIGEST steadfastly will refuse to support this action. Public opinion will not tolerate it. Congressmen who vote for such an attack on decency and defense, when they run for re-election, will find the sin remembered by more good Americans than they dream are interested.

## GLENN CURTISS AIRPORT

**L**OCATED at North Beach, on the north shore of Long Island, N. Y., Glenn Curtiss Airport is fully equipped for marine and land operations. It is but fifteen minutes by speedboat from the foot of 42nd street at the East River and can be reached by subway or automobile from Times Square in about thirty minutes. The location of the field was chosen because of its proximity to midtown New York and because of the favorable nature of the prevailing weather conditions.

A seaplane ramp and one hangar were built in the spring of 1929. It was then decided to build a flying field adjacent to the ramp. The contemplation of such a field seemed almost absurd. All that existed was a wooded hill sloping down into Bowery Bay. The tremendous task of converting this site into a modern flying field was placed in the hands of W. F. Carey, formerly general superintendent of excavation in the building of the Panama Canal. Mr. Carey at this time was president of the New York Air Terminals, Inc., a subsidiary of the Curtiss-Wright Corp., and was assisted in the building of the port by Theodore Pyle, his chief engineer, and J. W. Adams, resident engineer.

The problem facing these men was the moving of North Beach hill down into Bowery Bay as fill. This was done by sluicing the hill away with the aid of high-pressure guns discharging water pumped from the East River. Over

900,000 cubic yards of fill were pumped in this manner, and with the aid of a steam shovel and dredge, over one million more cubic yards of fill were secured.

The field has three runways of 2,200, 2,350 and 2,500 feet, respectively, crossing at a central circle of 600-foot diameter, allowing for take-offs in all directions. The runways were made of an oxide material, rolled into the field.

The port is excellently lighted for night operation. There are fifty-five boundary lights and twenty flush type landing lights on the runway in the direction of the prevailing wind. These lights were furnished for demonstration and experimental purposes by the Airport Lighting Co. There is an illuminated wind tee and cone at each end of the field, together with a Sperry AGA floodlight of 2,000,000 candlepower and a revolving beacon with a green and white lens of 2,000,000 candlepower. There is also a floodlight on the ramp, together with edge lights and a ceiling indicator.

Three modern hangars, made of steel and asbestos, are 120 by 120 feet, with a twenty-foot clearance and are equipped with lean-tos and office rooms. Here are stored more than seventy ships, many of them owned by sportsmen from Manhattan, Westchester and Queens counties. Plans are already under way for the building of two additional hangars.

The propeller shop is regarded as one

of the finest in the East. It is under the charge of E. W. Pester, who is said to have been builder of the first steel propeller in the United States.

The field is equipped with a complete radio communication system which receives weather reports from Department of Commerce stations all over the United States both day and night. A traffic operator is stationed at the point of take-off, and all outgoing ships must leave a report of their destination and secure a printed weather report covering their flight.

The terminal for the aviation unit of the New York City Police Department has been located at Glenn Curtiss Airport for several years. Their equipment consists of three Savoia-Marchetti flying boats and amphibions, a Keystone *Commuter* amphibion and a Fleet training plane for land flying. The unit is under the supervision of Capt. A. W. Wallander.

The German Dornier flying boat, Do.X, has been in drydock at North Beach since its arrival in New York last summer and has been one of the attractions which prompted almost a million people to visit the field. At the present time the Do.X is being prepared for an early return flight to Germany.

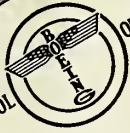
The development and success of this airport has been made possible by the management of the late Capt. Harry Rogers, whose personal interest in all its activities placed the airport high in the estimation of transient pilots as well as the visiting public.



Near the shadows of Manhattan's tall towers, Glenn Curtiss Airport is a fitting reminder of an illustrious pioneer

**BOEING  
SCHOOL OF  
AERONAUTICS  
reports:  
"STUDENTS  
LEARN  
FASTER ON THE  
AIRWHEEL"**

**BOEING SCHOOL OF AERONAUTICS**



Oakland, California  
February 5, 1932.

Goodyear Tire & Rubber Company of  
California, Inc.,  
450 Townsend St.,  
San Francisco, California.

Attention Mr. R. J. Daeg

Gentlemen:

We find the use of Goodyear airwheels, which we now have on all of our primary training planes, to be very satisfactory.

The Goodyear airwheels are used on all our Boeing 203 primary training planes, equipped with Wright motors, 155 H. P., Gross weight 2475 lbs., and on our Stinson, Jr., four-place cabin plane, with Lycoming motor, 210 H. P., Gross weight 3195 lbs. We have not equipped all of our planes with Goodyear airwheels because our students, whom we are training to be commercial pilots, should have experience on all types of wheels.

We find that the dual instruction necessary before a student solos is cut down one hour due to the use of the Goodyear airwheels. We require the following before a student solos: proficiency in takeoff, simple air flying, stalls, glides, takeups, landings and actual forced landings.

It is believed that the Goodyear airwheels will more than pay for themselves during a year in the saving of general wear on the plane.

Yours very truly,  
BOEING SCHOOL OF AERONAUTICS  
By *T. Lee, Jr.* General Manager



Here's another report, added to list telling the safety, the savings, the improvement in flying found in the Goodyear Airwheel.

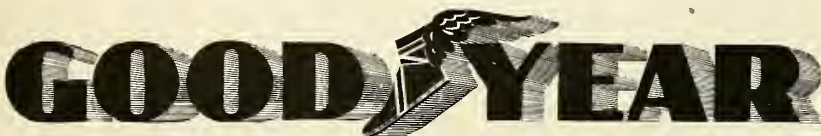
The whole letter's good, but read these points particularly:

*"We find that the dual instruction necessary before a student solos is cut down one hour*

*due to the use of the Goodyear Airwheel."*

*"It is believed that the Goodyear Airwheels will more than pay for themselves during a year in the saving of general wear on the plane."*

For all the facts, write to Aeronautics Department, Goodyear, Akron, Ohio, or Los Angeles, California.



**WHEN YOU BUY A NEW SHIP SPECIFY THE GOODYEAR AIRWHEEL**

## CURRENT AIRPORT AND AIRWAY FACTS

### 1932 Traffic Shows Gain

PASSENGER traffic on scheduled air transport lines in the United States increased thirty per cent during January and February, as compared with the same period last year, according to Department of Commerce figures. A total of 50,386 passengers used the airlines in the first two months of 1932. In January and February last year 38,527 air passengers were reported.

Passenger miles increased from the 8,968,256 recorded during the first two months of 1931 to 13,135,913 in 1932. A total of 8,616,818 miles were scheduled and 7,127,477 miles flown in January and February of this year, an increase of more than fifty per cent over the 5,386,398 miles scheduled and 4,763,701 miles flown during the same period in 1931.

Air express showed large gains this year as compared with 1931. During January and February of this year 188,918 pounds were carried. A total of 123,518 pounds were reported in 1931 and 27,884 pounds in 1930.

Gasoline and oil consumption also showed an increase this year, 2,840,164 gallons of fuel and 83,636 gallons of oil being used up to March 1.

### Fords Fly 10,000,000 Miles

A RECORDED total of more than 10,000,000 miles was flown in 1931 by Ford all-metal trimotor transport planes, according to reports by the Ford Motor Co. These flying operations, the reports show, were conducted throughout North and South America.

The actual total reported for the year was 10,467,167 miles. This was an increase of about forty per cent over the 7,495,985 miles flown in 1930 and more than sixty per cent greater than the 6,097,459 miles reported in 1929. Several companies have not yet reported their 1931 operations, so the final total mileage is expected to be much greater.

### Plan Trans-Atlantic Airline

PAN AMERICAN Airways System has entered into an agreement of association with Transamerican Airlines in the latter company's project of developing an air route across the North Atlantic to Northern Europe by way of Canada, Greenland, Iceland, the Faroes and Shetland Islands, it has been announced. It was reported that the Pan American Airways Corp., holding company for the Pan American Airways System, had entered into an agreement with Transamerican Airlines Corp., under which Pan American Airlines in conducting the necessary research and further survey work looking toward the operation of an

air route to Northern Europe. It was stated that a thorough study of all existing data will be further extended, as a step preliminary to the actual launching of exploratory flights through the North.

Pan American Airways System and European airlines have been carrying on technical research and surveys regarding the project for over two years, and Transamerican Airlines have conducted field research with a view toward the development of a practical trans-Atlantic flying route through the North. For many months the noted polar explorer, Vilhjalmur Stefansson, who first proposed a northern commercial air route to Europe more than thirteen years ago, has been engaged in correlating data on the territory to be covered. The Parliament of Iceland recently passed an Act granting to Transamerican Airlines and their associated interests a seventy-five year franchise for the transportation of mail over Iceland on an air route between North America and Europe. Canada also has encouraged the projects. Negotiations are reported to be under way for the securing of the necessary operating rights from other countries along the route.

The specific routing of the proposed airline has not been determined, pending the further extension of surveys which have been made during the past two years. It was stated, however, that the principle upon which present studies are being made calls for the consideration of flying inland routes wherever possible, to avoid the weather barriers encountered along the coastlines of the northern countries and to reduce to the shortest possible mileage the over-water sections necessary to be flown in the upper latitudes.

### United Reports Gain

FLYING 93.1 per cent of their scheduled mileage for the month, United Air Lines carried thirty-one per cent more revenue passengers, sixteen per cent more mail and flew eleven per cent more miles in March than in February. Reduction of rates to equal rail plus Pullman fares has resulted in additional revenues more than offsetting the loss due to a lower rate.

### Bowen Reports Progress

IN the one and one-half years the Bowen airlines have operated out of Oklahoma City, Okla., 30,000 pay passengers have been carried at an average speed of 153 miles an hour, figures compiled April 2 by Temple Bowen, president, showed. In transporting the passengers, company planes flew more than 2,000,000 miles. No passenger nor pilot has been injured on the line since service was inaugurated.

### New R. I. Aviation Commission

SENATOR Harry Bodwell of Cranston, Judge Raymond J. McMahon of Pawtucket and Percy W. Hathaway of South Kingstown have been appointed members of the newly created State Aviation Commission, which will assume charge of the Rhode Island State Airport. The appointments were made by Gov. Norman S. Case and confirmed by the state senate.

Senator Bodwell is chairman of the commission. Judge McMahon is a director of What Cheer Airport, Pawtucket, and Mr. Hathaway was a member of the original airport commission. The appointments were for six, two and four years respectively.

### Eastern Air Transport Gains

AIR passenger volume over the Eastern Air Transport System, a division of North American Aviation, increased sixty-two per cent in the first quarter of 1932 over the same period last year, when 4,944 passengers were carried, the company stated today. Air mail volume, which in 1931 totaled 244,850 pounds during the first three months, increased slightly this year. Eastern Air Transport operates to twenty-six East Coast cities. The company has flown a total of 8,277,000 miles in nearly four years of service to these cities.

During the Japanese cherry blossom season in Washington, D. C., pilots of the line were ordered to fly directly over the display when passing over the city.

### Almost 2,400,000 Air Passengers

CIVIL aircraft of the United States carried 2,389,862 passengers and flew 141,729,107 miles in all types of operations during 1931, according to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. These figures were compiled from operations of scheduled air transport lines, of routes extending into Canada, Mexico, Central and South America, and from miscellaneous operations. The latter included student instruction, experimental flying, miscellaneous commercial flying, such as charter work, sight-seeing, dusting crops and aerial photography, and pleasure flying. They transported 1,867,517 passengers during the year and flew 94,343,115 miles.

Miles flown per accident in miscellaneous flying operations during the last six months of 1931 averaged 42,129, according to a recent announcement by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. Miles flown per fatal accident during the last half of 1931 were 354,587, while miles flown per passenger fatality were 537,479.

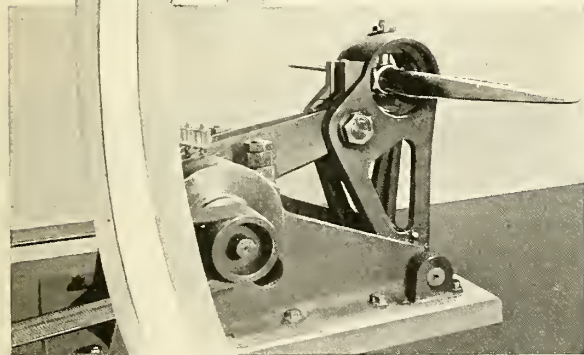
A total of 1,212 accidents occurred in miscellaneous flying during the last half of 1931. Nine hundred eighty-seven of these involved no injuries, or only minor

(Continued on following page)



How RESEARCH *plays its part in*

# Hamilton Standard PROPELLER DEPENDABILITY



*This vibrating machine (upon which patents are pending) approximates in a few hours the vibration stresses of thousands of hours of flying.*

The propeller vibrating machine recently developed by Hamilton Standard affords a means of predetermining the resistance of a propeller to fatigue failure from stresses met in actual service conditions. Particularly is this true of the vibration stresses due to the hammer blow effect from the power stroke of the engine. Through the use of this machine a test on the strength of a propeller may be run in a few hours, while it would require several thousand hours to complete an equivalent test in actual service. The practice of subjecting all new designs to thorough tests on this machine constitutes one more basic contribution to Hamilton Standard propeller reliability.

HAMILTON STANDARD PROPELLER COMPANY · EAST HARTFORD, CONNECTICUT

DIVISION OF UNITED AIRCRAFT & TRANSPORT CORPORATION  
EXPORT REPRESENTATIVE: UNITED AIRCRAFT EXPORTS, INC.  
230 PARK AVENUE, NEW YORK, U. S. A.



(Continued from preceding page)

injuries, to pilots and passengers. Only 144 involved fatalities.

#### February Air Express Gains

SCHEDULED airlines operating in continental United States carried an increase of eighty per cent in express pounds in February as compared with January, according to reports from thirty of the thirty-two companies operating, it was announced recently by the Aeronautics Branch of the Department of Commerce. Total express poundage was 64,996 for February. Miles flown by the scheduled airlines reporting for the month were 3,169,171, passengers totaled 23,982 and passenger miles flown were 5,646,231.

#### Lower Average Air Fares

THE average fare rate per mile on air passenger lines in the United States is 6.29 cents per mile, which is seven per cent lower than the fare in effect at the beginning of 1932 and only about half of the average rate in effect on January 1, 1930. Average fare rates in effect since 1927 on the domestic air passenger lines follow: January 1, 1927, twelve cents per mile; January 1, 1928, 10.6 cents per mile; January 1, 1929, eleven cents; January 1, 1930, twelve cents; January 1, 1931, 8.3 cents; January 1, 1932, 6.74 cents per mile. The rates were computed from reports received by the Aeronautics Branch, Department of Commerce, from the operators of American air transport lines, which now include 50,000 miles of air routes.

#### Lambert Field Report

FIGURES on the volume of air traffic handled at Lambert-St. Louis Municipal Airport, reported last month by O. R. Parks, manager, disclosed a decided gain for 1931. The figures reveal that passenger air traffic at the port

increased six per cent last year as compared to the previous year and that the volume of air mail traffic handled at the field also was considerably greater.

The number of passengers arriving at the airport in 1931 was 12,491, while the outgoing passengers reached 13,216, a total of 25,707. This is a net increase of 1,455 persons over 1930, when the number of incoming passengers at the field totaled 11,784, and the outgoing, 12,468.

The increase in the volume of air mail traffic during the 1930-31 period was 30,441 pounds, the report showed. Incoming mail at the field in 1931 was 159,761 pounds and the outbound, 139,152 pounds, a total of 298,913 pounds. During 1930 a total of 147,727 pounds of mail was forwarded out of St. Louis and 120,745 pounds were received.

#### American Airways Shows Increase

PLANES of the American Airways, Inc., flew 847,330 miles in scheduled mail and passenger service and carried 5,169 revenue passengers and 131,980 pounds of mail during March, according to an announcement by LaMotte T. Cohu, president of the company.

Mr. Cohu said that the figures for the first quarter of 1932, as compared with the first quarter of 1931, showed an increase of 53.3 per cent in miles flown, 74.2 per cent in revenue passengers and 5.8 per cent in mail poundage. He attributed the tremendous passenger increase to the success of American Airways' Business Travel Planning Service, by which all methods of transportation are coordinated to effect saving of business hours.

The quarterly traffic figures are as follows:

	1931	1932
Total miles flown . . .	1,557,780	2,388,590
Revenue passengers . . .	6,580	11,465
Pounds of mail . . . .	339,677	359,565

#### Rhode Island Airport Appropriation

AN appropriation of \$82,500 for improvement and maintenance of the Rhode Island State Airport during the year 1932-33 has been approved by State Finance Commissioner Frederick S. Peck and passed by the General Assembly. Improvements to the airport included in the appropriation amount to \$77,500 and bring the total appropriations for the airport to \$446,000. The bill includes a \$55,500 appropriation for lighting the field, improving the land and erecting bleachers and an administrative building. An allotment of \$22,000 is made for land damages and maintenance, and the \$5,000 balance of the \$82,500 is appropriated for holding air meets and exhibitions.

#### United Expands Schedules

UNITED AIR LINES will inaugurate a second twenty-eight-hour coast-to-coast trimotor passenger plane service on May 1. Ford trimotors are used between New York and Chicago and Boeing trimotors between Chicago and the Pacific Coast. The additional schedule makes it possible to leave New York at 5:00 p. m. and Chicago at 12:30 a. m., arriving in San Francisco and Pacific Coast points at 9:50 the following evening. On United's new through trimotor additional service eastbound, passengers leave San Francisco at 11:45 p. m., arriving in Chicago the following evening.

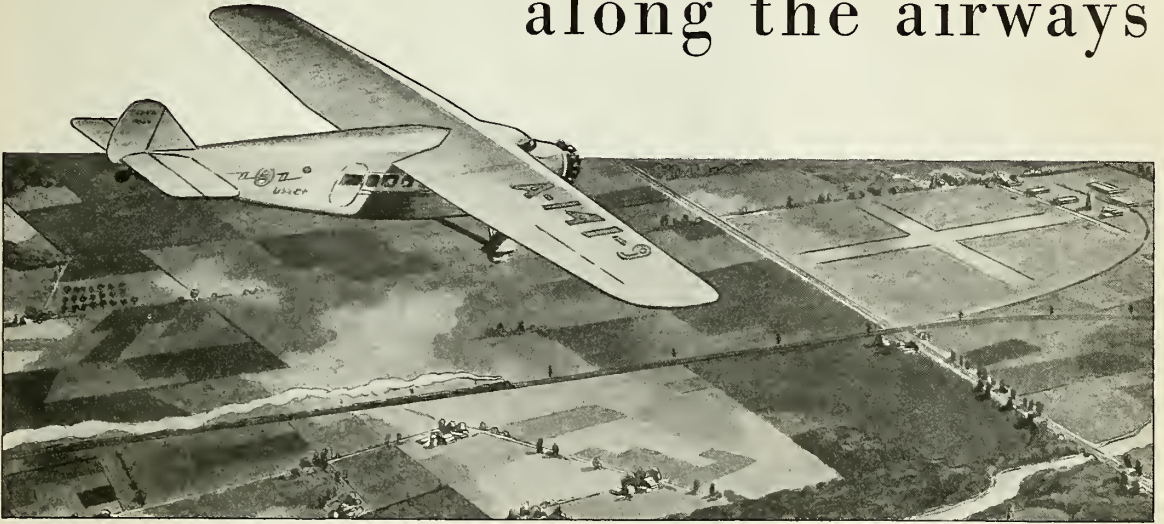
United now has five instead of four daily trimotored flights between Cleveland and Chicago, and four between Chicago and New York. Of the approximate 38,000 miles flown daily by United Air Lines planes, half is at night. An overnight service was started recently between Chicago and Dallas, Texas.

(Continued on following page)



Passengers boarding the United Air Lines Ford trimotor on the new overnight service between Chicago and Dallas

# Why *written* messages flash along the airways



A NEW AIR LINE was ready to be opened. Planes had been bought. Airports selected. Schedules arranged. To head the enterprise, a young executive of wide experience had been chosen.

"We will want all our airports, and the principal central-city offices linked together by Teletypewriters," he said. "They are important to nearly every phase of our operations."

Teletypewriters flash instant, *written* messages between connected offices. Pressing a key on one machine prints the corresponding character on any or all other machines, a few hundred feet or thousands of miles away.

This means maximum speed and absolute accuracy in the exchange of information . . . two

things of vital importance where the operation of airplanes is concerned. It contributes to safety in flight. Punctuality of schedules. Economy in handling traffic.

Teletypewriters are of value in sending and receiving last-minute weather reports. Plane movements. Reserving or releasing passenger space. Mail and freight information. Executive instructions. Accounting matters. Equipment requisitions.

Manufacturing concerns, as well as operating companies, are using Teletypewriter Service to advantage. Your local Bell company will gladly help you determine whether it can benefit your business. Just call the Telephone Business Office.

## THE NEW TELETYPEWRITER SERVICE

*The recently announced Teletypewriter Service permits any subscriber to it to typewrite by wire instantly to any other subscriber, whether he be around the corner or across the continent. This service differs from private line Teletypewriter Service, described above, in that any subscriber may ask for any other subscriber and be connected immediately by the teletypewriter "central."*



## TELETYPEWRITER SERVICE

*(Continued from preceding page)*  
**United Reorganizes Divisions**

IN connection with a reorganization of its western sections, United Air Lines has created three new divisions: Salt Lake to Boise, Boise to Pasco and Pasco to Seattle via Portland. The company has designated R. W. Ireland, formerly eastern division traffic manager, as district traffic manager at Chicago, and Thomas W. Wolfe, formerly district traffic manager at Chicago, as district traffic manager at Kansas City. The positions of central and eastern district manager have been eliminated. K. A. Kennedy, who has been manager of the sales promotion department of the Boeing School of Aeronautics at Oakland, Calif., is now affiliated with the general traffic office at Chicago.

**Busiest International Airport**

MIAMI, Fla., leads the United States as an international airport, according to recent customs reports. During the year ended June 30, 1931, there were 1,480 planes flown into Miami with 12,391 passengers. The city ranking next to Miami is Brownsville, Tex., with 807 planes and 3,475 passengers.

During 1931 Pan American Airways took a total of 12,906 travelers by air from Miami to Cuba, Haiti, Jamaica, the West Indies, Mexico, Central and South America. This was an increase of 56.6 per cent over the previous year. There were 8,390 passengers carried between Miami and Havana, a gain of 49.3 per cent.

**Airport Surfacing Report**

DESIGN and construction of airport landing area surfaces to meet most efficiently the needs of aircraft operations are discussed in the "Report of Committee on Airport Drainage and Surfacing," which was recently issued by the Aeronautics Branch of the Department of Commerce. It is pointed out in the report that each airport presents its own drainage and surfacing problems, which should be entrusted to specialists qualified to work out proper solutions meeting the engineering and economic considerations involved. Although not intended as a textbook on the general subject of drainage and surfacing, the report offers detailed suggestions as to methods of providing the facilities that are needed in this connection for operation of aircraft. Basic factors affecting the design of landing area surfaces are discussed, and consideration is given to grading, drainage, design of drainage systems and preparation of various types of surfaces, including turf, hard surfaced runways, transition strips, taxiways, aprons and warming-up platforms.

The Committee on Airport Drainage and Surfacing, organized by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics, and working under the chairmanship of Harry H. Blew, Director of Aeronautic Development of

the Department of Commerce, was composed of representatives of the Aeronautics Branch, the American Engineering Council and the American Road Builders' Association.

**Florida Plans Air Fields**

GEORGE W. McRORY, chairman of the airplane emergency landing field committee of the Florida Aviation Association, has been requested by the State Road Department to obtain land for construction of a system of landing fields along principal highways throughout the state. The road department has designated a system of eight preferential air routes. Fields will be constructed as rapidly as sites are obtained.

Number One air route will be from Jacksonville to Pensacola along road Number One; Number Two, from Tallahassee to West Palm Beach and Miami via Tampa and Fort Myers; Number Three, Sanford to Jacksonville via DeLand and Palatka; Number Four, Daytona Beach to Tampa via Kissimmee and Lakeland; Number Five, Orlando to Sanford; Number Six, Palm Beach to Bartow via Okeechobee, Sebring and Avon Park; Number Seven, Williston to Baldwin via Gainesville and Starke, and Number Eight, Melbourne to Williston via Orlando, Leesburg and Ocala.

The fields are to be constructed under authorization of the 1931 Legislature, which appropriated \$20,000 for the work. The next map of the road department will show fifty-four existing fields in the state, and eight Department of Commerce emergency fields on the east coast. Twenty-five emergency fields are necessary to complete the plan adopted by the Legislature.

With ten new airports during 1931, Florida led the entire South, according to a report by Peter Van Geyt, secretary of the Tampa Motor Club. The South had thirty-three new airports during 1931.

**New Galveston Airport**

GALVESTON'S 120-acre municipal airport was dedicated last month. A steel framework hangar with a capacity of ten planes has been erected and a stucco administration building completed. Improvements have been made at a cost of \$25,000. Robert Scholes has been appointed airport manager.

**California-Alaska Inland Route**

DEVELOPMENT of an inland air route from California to Alaska is proposed by the aviation committee of the Yakima, Wash., Chamber of Commerce, which has started to gather data on days of poor visibility for flying east of the Cascades. The project will be urged to the Department of Commerce as a military measure and as an alternative route for mail flying when visibility is poor on the coast.

**Better Middle Western Service**

A NEW passenger air service more closely linking nearly every leading city in the Middle West is scheduled to be inaugurated by American Airways, Inc., according to Col. Halsey Dunwoody, vice president. The new service will be operated between St. Louis, Evansville, Ind., and Louisville, Ky., and through a series of connections Omaha, Kansas City and St. Louis will be linked with Evansville, Nashville and Cincinnati; Indianapolis, with the Gulf and Southwest; and Nashville, with Indianapolis and Chicago.

Tentative plans provide for the departure of planes daily from St. Louis for Evansville, Louisville, Cincinnati, Columbus, Dayton and Cleveland, with plane and rail connections East. At St. Louis planes operating between Omaha, St. Joseph and Kansas City will connect with the eastbound service. It is also proposed that planes leave Nashville in the afternoon, arriving in Chicago early in the evening, giving the Tennessee city fast and direct service to Chicago, via Indianapolis. Departure from Louisville is planned for late afternoon, with arrival in Chicago scheduled for early evening.

**Change Tulsa Schedules**

SCHEDULE revisions for two Tulsa, Okla., airlines, the Bowen and Braniff systems, were announced recently.

On the Bowen line, serving Oklahoma and Texas, the plane that formerly left the city at 1:50 p. m. now leaves at 3:15, reaching Dallas, Tex., at 5:15; Fort Worth, Tex., at 5:35; Houston, Tex., at 6:55 p. m., and San Antonio, Tex., at 7:30 p. m. The schedule of the southbound ship leaving Tulsa at 4:38 p. m. remains unchanged.

On the Braniff system the southbound plane from Chicago and Kansas City arrives in Tulsa at 3:00 p. m., leaving for Oklahoma City at 3:05 p. m., while the ship from St. Louis, Mo., arrives at 2:45 p. m. Schedules for northbound planes out of Tulsa are not affected.

**New York-Boston Line Anniversary**

APRIL 15 marked the third anniversary of American Airways, Inc., air passenger service between New York and Boston. This was the first regular air passenger service to be inaugurated in the East, although air mail had been flown over this route by the same company since 1926. The initial schedule called for one plane a day in each direction, and during the first year approximately 5,000 passengers were carried. At the end of the third year twelve planes a day are flying between the two cities, and the passengers total 22,057. During its three years of operation this line has carried 39,563 revenue passengers between New York and Boston.

*(Continued on following page)*



**PIONEER  
AEROBATS**  
*made the F2B-1  
famous* \*



★ **BOEING**  
has *always* built  
*to-morrow's* airplanes  
**TO-DAY**

Back in the pioneer days of group aerobatics, this Boeing Wasp-powered model was selected by the Navy's crack team—the Three Sea Hawks—because of its known stamina and maneuverability. This was the first high-powered, air-cooled carrier fighter ever built—another instance of Boeing construction years ahead of its time . . . Boeing Airplane Company, Seattle, Subsidiary, United Aircraft & Transport Corporation.

(Continued from preceding page)  
**Long Island Model Airline**

A MODEL air transport line began operations on Long Island, N. Y., last month. The new airline will be operated by the Curtiss-Wright Flying Service on Sundays only until the volume of traffic requires an increased service.

The airline covers a thirty-six-mile triangular course, starting at the Curtiss-Wright Airport on Sunrise Highway, and crosses some of the most beautiful sections of Long Island. After leaving Curtiss-Wright Airport, the line's direction is northeast, passing over the towns of Valley Stream, Lynbrook, Malverne, Hempstead and Mineola. At Mineola the course is changed to northwest, skirting the north shore. Circling the Glenn Curtiss Airport at North Beach, the passengers view the skyscrapers of Manhattan. The return flight is over Flushing, Jamaica and other sections of Queens County.

The purpose of the airline, according to officials of Curtiss-Wright Airport, is to acquaint the public with the operation of a modern airline at a minimum charge.

#### To Resume Winnepesaukee Service

IN spite of a \$21,500 fire, which last month destroyed three planes of the New Hampshire Aviation Corp., Concord, N. H., the summer seaplane service of the company on Lake Winnepesaukee will be resumed with new equipment on June 15, according to Robert S. Fogg, vice president. The opening of the Lake Winnepesaukee schedules will mark the beginning of the tenth year of the service. The company has obtained a ten-year lease for exclusive flying rights at its base on the lake, The Weirs.

Among the six planes, some of them privately owned, lost in the fire was the *New Hampshire*, the Waco biplane in which Pilot Fogg flew to Greenly Island to obtain the first story and pictures of the crew of the *Bremen* following their landing. The same plane was used for securing pictures at Horse Island, Newfoundland, after the wreck of the sealing ship, *Viking*. Among other accomplishments effected in the *New Hampshire* was the establishment of an emergency air mail route in Vermont, when floods interfered with ordinary means of communication, and the making of a commercial altitude record.

#### Air Mail Anniversaries

THE sixth anniversary of air mail flying in the Pacific Northwest was celebrated recently by the United Air Lines, whose mail-passenger planes last month began the seventh year of operation on the Spokane-Boise-Salt Lake City airway.

In April, 1926, air mail in this section was carried for the first time by airplanes of Varney Air Lines, now a subsidiary

of United Air Lines, on a route between Pasco, Boise and Elko. At the latter point the line merged with the main transcontinental airway.

Six years ago April 15, Col. Charles A. Lindbergh, with Major Phil Love of St. Louis, flew the first mail from St. Louis to Chicago, inaugurating the first air mail service in the West. The first Government contract to an air transport company in the Middle West for carrying of the mail was awarded to the Chicago-St. Louis operators known then as the Robertson Aircraft Corporation. This route is now part of the American Airways, Inc., operating company of The Aviation Corporation.

During the first eight months of operation on the air mail route in excess of 22,000 pounds of mail was carried. Today the central division of American Airways carries more than 50,000 pounds of mail in a single month. From April 15, 1926, to April of this year the St. Louis-Chicago line of American Airways had a mileage total of more than 1,919,000 miles, carried in excess of 318,000 pounds of mail and transported approximately 25,000 passengers, according to Col. Halsey Dunwoody, American Airways vice president.

#### Pan American Shows Profit

AN operating profit of \$105,452, equalling twenty-one cents a share on 502,380 shares of outstanding no par common stock, was reported for 1931 by Pan American Airways Corp. recently. In 1930 the company showed an operating loss of \$305,272.

For last year the gross income from operations was reported to be \$7,913,587, an improvement over the previous year of more than \$2,300,000. The gain was attributed largely to the opening of new lines and a substantial increase in passenger traffic. Route mileage operated as of the end of 1931 amounted to 20,664 miles.

Current assets were \$2,575,123 against current liabilities of \$378,645, compared with current assets of \$2,289,104 and current liabilities of \$1,416,523 at the close of 1930.

#### Atlanta Dedicates Building

THE new administration building erected at Candler Field, Atlanta, Ga., at an approximate cost of \$50,000 was scheduled to be dedicated by the Atlanta Junior Chamber of Commerce on April 30, according to an announcement by Sam Wilkes, chairman of the Jaycee aviation committee. The erection of the building was the major project of the Jaycee organization last year. The city of Atlanta contributed \$35,000, and the county appropriated \$15,000 for the structure.

#### Manhattan Seaplane Terminals

THE advantages of seaplane terminals along the New York City waterfront are urged in a recent report of a committee of Aviators' Post No. 743, American Legion. The report points out the convenience of such a location, with the resultant lessening in time on flights from one city center to another. The present airports will be kept occupied to capacity maintaining the increased number of planes, it states.

Both the Hudson and East rivers are recommended as sites. The former has the advantage of size, while the latter is almost always free from ice. The report advocates that a floating ramp, consisting of a car float with its outboard end submerged, be used for the first city seaplane terminal.

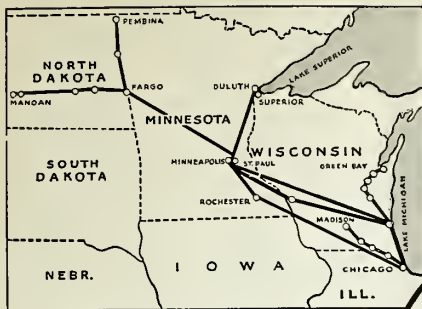
#### Servicing Aids at Burbank

MODERN servicing equipment and additional storage facilities at United Airport, Burbank, Calif., help to speed airplane fueling service to meet demands of faster airline schedules with shortened airport stop-overs and generally increased flying activity.

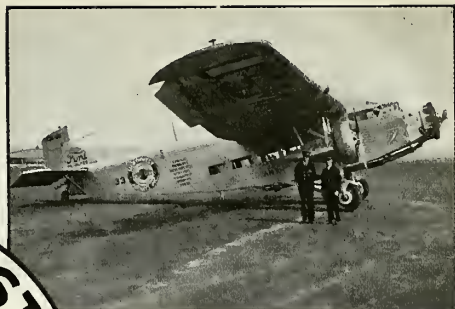
Airport-operated fueling trucks are available day and night to meet the needs of planes at any part of the large terminal. The largest service truck, a ten-wheel Moreland, was especially constructed for servicing planes at United Airport with two 500-gallon capacity gasoline tanks and seven oil tanks, two of seventy-five-gallon capacity and five of ten-gallon capacity, arranged so that different brands of gasoline and oil can be carried. Gasoline is delivered from this truck at the rate of from thirty to forty-five gallons per minute by a Blackmer rotary pump, operated by the truck's engine, through two fifty-foot lengths of hose 1¼ inches in diameter. Oil is delivered at the rate of fifteen gallons per minute by pressure from a compressed air tank through fifty-foot lengths of one-inch hose. The compressed air tank is part of the truck's equipment and can be used for pumping tires, etc. When not in use, the hose winds up on reels in a compartment at the rear of the truck, and each hose is equipped with a gauge instrument, located above the hose compartment, which registers the amount dispensed through hand-controlled nozzles. Other fueling trucks with approximately the same servicing advantages have, like the larger truck, additional equipment, including water tank and hose, fire-fighting apparatus, towing equipment, tools, etc. Each truck also is equipped with steel cable for grounding during fueling or loading operations.

Three gasoline storage pits of 8,000-gallon capacity are located adjacent to hangars and also are equipped for air-

(Continued on following page)



*Western Electric equipped routes flown by Northwest Airways, Inc.*



*One of Northwest's 19 Western Electric equipped mail and passenger planes*



*Inside one of Northwest's 8 Western Electric Radio Telephone equipped ground stations*

# NORTHWEST

## *pilots keep their schedules*

Clearly-spoken position reports from planes in flight—up-to-the-minute weather and landing information from ground stations—transmitted instantly by Western Electric Radio Telephone—assist Northwest Airways to operate efficiently, confidently, on time! ☐ Northwest Airways flies 1,650,000 miles a year, in good weather and bad. To assure dependable two-way radio telephone communication, Northwest has installed standard Western Electric 50 watt crystal controlled airplane systems in 19 planes. And has equipped 8 ground stations with Western Electric 9-B transmitters and 2-B rectifiers. ☐ All the major airlines in the country have standardized on Western Electric. There's special equipment for small planes, too. For details, write to Western Electric Company, Dept. 271 AD, 195 Broadway, New York.

# *Western Electric*<sup>\*</sup> Aviation Communication Systems

MADE BY THE MAKERS



OF BELL TELEPHONES

*\*Northern Electric in Canada*

(Continued from preceding page)

plane fueling service. Electrically operated pumps deliver gasoline at the rate of forty gallons per minute through sixty-foot hose lengths, which wind up on reels inside the pits. Gauge instruments inside the pits register the amount dispensed through hand-controlled nozzles. Pits are sunken into paving strips adjoining asphalt runways and when not in use are covered with hinged steel doors of ample strength to permit transport planes' taxiing over them.

The gasoline supply for service trucks is delivered from storage pits, and the oil supply is replenished from an oil house, located apart from hangars and other buildings to avoid danger of fire, with a capacity of 2,000 gallons of oil in drums.

### New Airports Established

THE following municipalities have reported the recent establishment of airports, according to the Aeronautics Branch of the Department of Commerce: San Gabriel, Merced, Long Beach and Vallejo, Calif.; Centerville, Iowa; Morganton, N. C.; Duncansville, Pa.; Norfolk, Va.; Brunswick, Ga., and Princess Anne, Maryland.

Proposed airports are listed for the following places: Carthage, N. Y.; Philadelphia, Pa.; Warsaw, Mo.; Findlay, Ohio; Rehoboth Beach, Dela.; Muncie, Ind.; Liberal, Kans.; Santa Fe, N. M.; Clinton, Okla., and East Bank, West Virginia. Improvements are contemplated for airports at Visalia, Calif.; Baltimore, Md.; Chattanooga, Tenn., and Saint Ignace, Michigan.

velop adequate aids to aviation. In this line, numerous obstruction lights have also been erected through the cooperation of various agencies.

This department feels that intelligent understanding of aviation and aeronautics must come through fundamental educational processes. Accordingly, contacts have been made with all the school systems of our state, and the department is preparing exhibits, making lectures and helping to form aviation clubs in our high schools. We also frequently urge the press to encourage the dissemination of accurate information concerning any aeronautical development in the line of manufacture, operation or the reporting of events.

An analysis of the history of aviation in New Jersey reveals that stunting has accounted for too large a share of fatalities. Therefore, strict regulation of all air meets, and these only after authority has been granted and the program approved by the Director of Aviation, has been considered advisable.

A very small percentage of our activity has to do with disciplinary efforts. Practically every responsible operator and pilot recognizes that the standards of airworthiness in regard to personnel, equipment and terrain are to the best interests of all concerned. The few who insist on contrary operation will be eliminated from the picture.

The State Department operates on a strictly limited annual budget, and it is determined to keep the department on an economical basis, which we feel can be done as long as the cooperation of the past year by various municipalities, operating companies and other state departments is continued. There is no state tax on any phase of aeronautics, for it is felt that the operators' overhead, because of research, experiment and development, is a burden so heavy that every consideration possible should be shown, and so long as this department remains within the limits of a very narrow budget, no tax need be imposed on the industry for its support. From the standpoint of the state, the protection of the traveling public that the department promotes is thus also economically secured.

The organization of the department is composed of five commissioners and a director of aviation, who is the administrative officer of the department. According to the law, three members of the commission must be actively engaged in the aviation industry and the director must be a pilot. Actually, every member of the New Jersey State Aviation Commission has had definite experience in aviation. It is composed of Thomas W. Streeter, chairman; Richard Aldworth, airport manager; M. H. Goodnough, air transport official; Wayne Sanger Green, air transport official, and Peter J. O'Toole, Jr., municipal official.

## How New Jersey Regulates Aeronautical Activities

By Gill Robb Wilson, State Director of Aviation for New Jersey

In its first year of existence, the State of New Jersey Department of Aviation has devoted a considerable part of its activity to a survey of existing conditions. It was felt that no policy could be decided upon until a thorough understanding of the situation was reached and until an analysis of the proper functions of a state aeronautics department had been developed. However, a beginning in state regulation of aeronautics has been accomplished.

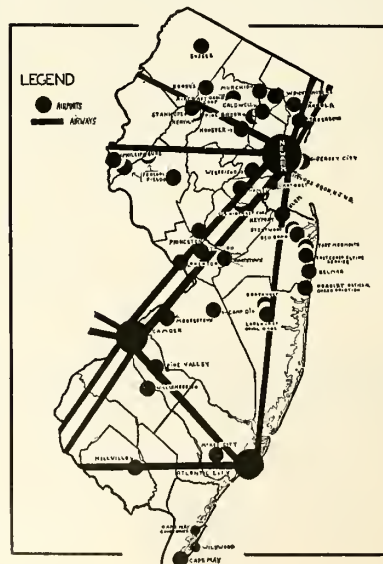
A compilation of existing aeronautic legislation was first made. The State Department felt that regulation should be confined to the development of greater safety. Accordingly, legislation has been enacted which calls for Federal Department of Commerce licenses for all pilots and all aircraft and a state permit for the operation of any commercial airport or landing field.

A study was made of the airports and landing fields of the state. Scale photographs of all were taken and descriptions and histories of the various bases compiled. Thus a need for auxiliary or emergency fields in certain sections of the state was revealed, and steps are being taken to form contacts with various communities in attempts to supply this need. Every consideration will be given to the fixed base operator, and it is the thought of this department that no man who makes a permanent investment will be barnstormed out of existence.

New Jersey is the busiest airway in the world. Approximately 2,000,000 pounds of mail and 200,000 passengers are carried every year, and there are

within the boundaries of the state thirty-one commercial fields, six military fields and fifty-eight temporary air bases, as well as various industrial plants producing airplane engines, airplanes, parachutes, control cable, shields, aviation instruments, radios and aviation tools.

Aerial marking in the state was negligible, and a program is under way in which the State Highway Department, the towns and municipalities, the state military authorities and various institutions and individuals are helping to de-





# AMERICAN STEEL SHEETS

## Serving in the Conquest of the Skies



**KEYSTONE** Rust Resisting Copper Steel SHEETS  
FOR AIRPORT BUILDINGS, HANGARS, SHOPS, SHEDS, TANKS, CULVERTS, ETC.

**I**N the growing aviation industry, AMERICAN Steel Sheets are called upon for most exacting and important service—because these Sheets are dependable and meet qualifications that are necessarily strict.

KEYSTONE Quality (steel alloyed with copper) is unexcelled for all outside uses. Culverts of this material make drier, safer landing fields. Hangars, shops, and sheds of KEYSTONE Quality are fireproof and durable—and for all uses in construction or equipment to which sheet metal is suitable, there AMERICAN Sheets excel and render excellent service.

We also manufacture



**STAINLESS**  
and Heat Resisting  
STEEL SHEETS  
AND LIGHT PLATES

AMERICAN products include a complete line of Steel Sheets and Tin Plates for all known uses. These products have long been the choice of railroads, automobile makers, and the construction interests—and now command favor in the aviation field.

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# PERSONALITIES



WHENEVER some old codger gets a newspaper write-up for no sounder reason than that he has cheated the undertakers and hung on here, practically unnoticed, until he was over ninety, the inquiring reporter invariably and monotonously asks, "To what do you attribute your long life, Mr. Glumph?" And the old duffer, instead of being honest about it and admitting frankly that he simply was too mean to move on out of the way, goes on to offer one of two stock explanations or apologies, to wit: Either he never smoked tobacco, nor drank whisky, or else he smoked eight cigars and drank a quart of whisky every day of his life

There is no half way about it. To live long enough to qualify as a perpetual hanger on, either you smoke and drink nothing, or you smoke and drink everything in sight. The fellow who passes out early is the one who smokes and drinks in moderation. That is fatal. I attribute my own decay and advancing senility to tea in early and impressionable youth, pots and pots of it, resulting in a pastel tinted interior, floating kidneys, and seventeen Orange Pekoe tea leaves lodged in my appendix. I doubt if I'll reach eighty. (Nor will General Motors and U. S. Steel.) My grandfather, not only a tea tippler but a confirmed coffee swisher, was cut off in the flower of his manhood at ninety-six. He might have hit par, only he developed the fatal habit of sipping from the saucer and was shot on the night of June 8, 1899, by an outraged head waiter in the Astor Grill.

On the very night ole granpappy passed out for the last time—he'd often passed out before but never with the assistance of a head waiter—on that very night an unsuspecting infant arrived at a place called Lake Nebagamon, Wisconsin. This was merely a coincidence, there being no connection whatever between granpappy and this infant, who was born and who remained a teetotaler—a condition that would have shocked ole granpappy and thrown him into a decline if he'd been alive to hear of it. This infant was named Noel Wien and was successfully raised by his parents on a farm in Minnesota, which gave him a hardy constitution and a Minnesota accent. Noel's grandfather was a pioneer homesteader of Wisconsin, one Hans Eric Hanson—evidently an Irishman—and such a hardy settler that merely for diversion he would gnaw

the bark off a spruce tree or plow an odd acre of virgin soil simply by playfully kicking over the sod with his feet.

Noel worked on the farm and took aboard his education in the grade schools of St. Louis County, Minnesota, where it's so quiet that a lad may study undisturbed. In January, 1921, he went forth to seek his fortune in the great city of Minneapolis, where he refused to buy an interest in a bridge which a city slicker tried to sell him, and also refused a half interest in the Union Depot that another bird with a trick moustache tried to unload on him. Evading every snare of a great Metropolis, Noel took a course in automobile mechanics, visited a flying school, and although he had refused to buy a piece of the bridge or the Union Depot, he took a flying course with Major Ray S. Miller, Commanding Officer, 109th Aero Squadron, Minnesota National Guard, and in three hours was ready to solo. If we city slickers don't get these country boys one way, we get 'em another.

He went solo that summer in a ship



Noel Wien, up north of fifty-three

owned by E. W. Morrill, with whom he carried passengers and made exhibition flights at fairs. Then he flew for George Shermerhorn, Byron Dawson and William B. Yunker and instructed students for the Curtiss Northwest Airplane Co. during 1922. In May, 1923, he joined the Federated Flyers Flying Circus and toured Minnesota, the Dakotas, Montana, Utah, Nevada, Arizona and Texas, in all of which states men are men and wear galluses and drink from moustache cups.

About the most remarkable fact that developed about this young pilot was that he didn't smoke, chew, swear or drink anything stronger than milk and water. I've known pilots who didn't chew, quite a few who didn't drink and some who didn't smoke, but this Noel is the first one I've heard of who wouldn't take tea and coffee. He started out determined to eat and drink only what was best for his health, and today he's the healthiest human north of fifty-three. The brown and black bears of Alaska take one look at him in his fur suit and pass on by. They mistake him for another and possibly healthier bear. Thus here we have the beginnings of one of those old gaffers to whom reporters of 1999 will say, "And to what do you attribute your long life, Mr. Wien?"

He got to California, but as that's no place for a pilot who drinks nothing but milk and water—or Jerry McClelland would have been away from there long ago—off went Noel to Alaska in June, 1924, where he has been doing commercial flying for the greater part of the years since, except for an interval in 1926 when he flew for Snyder's Flying Circus in Wisconsin, Illinois and Ohio. In 1927 with his brother, Ralph Wien, and Gene Miller he bought an old Standard for \$750 and started to do commercial flying in Alaska. Two months later the brothers bought out Miller and in October, 1928, they incorporated the Wien Alaska Airways, which in 1929 they sold out to Alaska Airways, Inc., a subsidiary of American Airways. That old country boy even knew when to sell out to those smart city fellers! It must have been the wholesome milk diet that did it. I wouldn't be surprised if the city fellers wish now that they'd stuck to milk, too.

This stout old farm boy has gone through some tough experiences up North. In May, 1925, coming back to Fairbanks from the first trip to Wiseman, (Continued on following page)

# Use Roosevelt Field

AMERICA'S PREMIER AIRPORT

*The Center of Commercial Aviation in the East*



*Typical Concrete and Steel Hangars*



*Typical Wooden Hangars and Buildings*

## ★ The Most Logical and Ideal Location ★

**LOCATION:** Most conveniently accessible by air from other metropolitan airports and Northeastern U.S. Situated well away from water, swamps and industrial smoke, the meteorological conditions are the best in the area.

**SAFETY:** Offers greatest flying safety with three great airports, twelve golf courses and open country all within a three mile radius, absence of congested building areas, water and swamps. Emergency landings are safe.

**FACILITIES:** Fifty buildings, 350,000 sq. ft. bangar space of which 131,000 is in new concrete and steel hangars, complete night lighting, two famous all-way fields with 1,800,000 sq. ft. paved runways, taxiways and aprons.

**COST:** Rental from 32¢ per sq. ft. per year up, according to buildings, which is most reasonable considering facilities and convenience to the world's largest city and America's densest flying area.

**ACTIVITY:** There are more airplanes in New York than any other State, more in its metropolitan area than elsewhere in New York, and twice as many at Roosevelt Field than at any other metropolitan airport.

**PROMINENCE:** The most famous and widely known aeronautical address in the world, it has long dominated as the commercial aviation center of the East. This is a valuable asset to your aeronautical business.

## MOST CONVENIENT TO NEW YORK CITY

Express train service provides shortest and most dependable transportation to center of Manhattan. Over 80 trains per day, some taking only 32 minutes, ply between Penn. Station, N. Y. City and Mineola, the Field station. Excellent motor roads and a private parkway lead to the Airport.



*The Roosevelt Field Hotel - Modern in every appointment*

**Airplane Agencies:** Bird, Lockheed, Monocoques, Aeromarine-Klemm, Kittyhawk, Stearman, Stinson, Waco, Aeronca, Fairchild, Fleet, Standard, Aristocrat, Amphibions, Travel Air, Kellert Autogiro, Curtiss-Wright, Rearwin-Kenroyce.

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Sheet Metal & Welding Co., Parker Motor Rebuilding Co., Roosevelt Aviation School, Inc., Giro Sales & Service, Aero Trades Co., Engine Air Service. **Supply Houses:** Air Associates, Inc., Air Transport Equipment, Inc.

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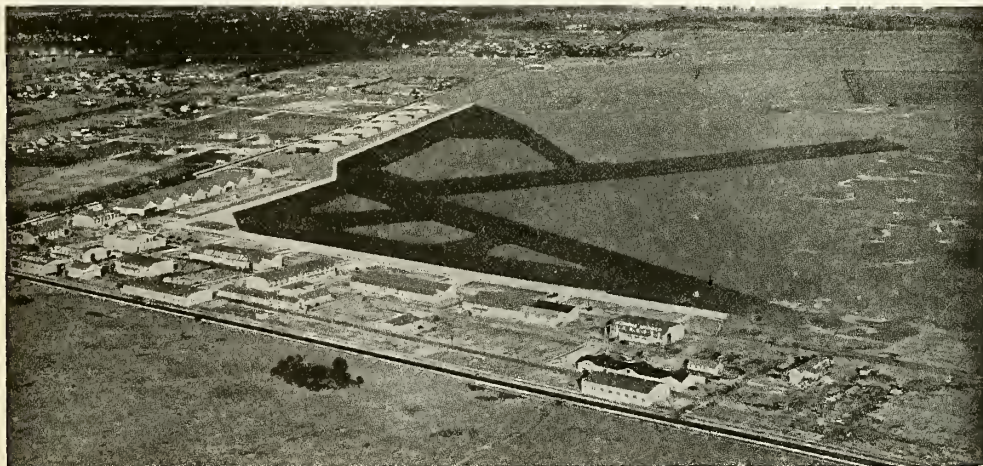
**Manufacturers:** Amphibions, Inc., Fleetwings, Inc., General Airplanes, Inc., Grover Loening Aircraft Co., Air Transport Equipment.

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Write us your requirements

## ROOSEVELT FIELD, INC.

Drawer F  
MINEOLA, N. Y.

(Continued from preceding page)

he encountered strong head winds and ran out of fuel. He landed and started to walk to Nenana, a distance of forty miles as the crow flies. But Noel wasn't a crow, so it took him three days on foot. He built rafts to cross the rivers; he had no food and could drink no water, as the country was covered with dead rabbits that contaminated all streams. It was also covered with brown and black bears, none of them dead. However, they took one look at Noel in that fur hide of his and said, "Pass, friend, all is well." You see, he has spent so much time inside that suit that he can understand bears—which is more than the Administration at Washington can do.

In May, 1928, while carrying a movie outfit to Point Barrow, Noel Wien and the late Russell Hyde Merrill of the Anchorage Air Transport were forced down by fog and landed their two ships on a frozen lake a hundred miles from Point Barrow. When the fog lifted, only Noel could take off because his ship was equipped with over-size tires. He flew to Point Barrow with his passengers and returned to aid the stranded machine. But in that flat tundra moss-covered country, with no landmarks to go by, he could not find the lake on which they had landed, although he flew a total of fifty-six hours during the best of the poor flying weather available. He landed at Eskimo villages, at camps and at isolated trappers' cabins, sending out men with dog teams to aid in the search for Pilot Merrill and his two passengers.

Nineteen days after they had landed on that lake, John Hegness of Cape Hallet found Merrill, who had started alone to get help for his passengers. He had been living by eating rodents and some rotten reindeer meat that he had found in a cache. Clark and Robertson, the two passengers, were found by Matt A. Nieminen, the other pilot of Anchorage Air Transport, and flown out of the wilderness where they had been starving for over two weeks.

Russell Merrill, a fine fellow and a good pilot, made his last flight on Sept. 16, 1929, when he took off from Anchorage to carry a piece of machinery to a mining camp across the inlet and mountain range southwest of Anchorage. He was never seen again. Other pilots and planes from Anchorage and Fairbanks searched for days, but no trace of the missing pilot and plane was found. It is the general belief that he was forced down on the inlet and his plane swamped by the heavy water. Ralph Wien was killed in a crash at Kotzebue, Alaska, Oct. 12, 1930, in a Catholic Mission plane. Hardship, danger and death must be dared by those who fly in the Arctic, a land not for the timid and the weak. Our little struggles and triumphs, our

fears, our hopes, our failures down here in a settled country seem petty when compared to the experiences of those who live and fly in the land of the midnight sun.

Noel Wien made the first flight from Nome to North Siberia and return, a distance of a thousand miles, on March 7 and 8, 1929, when he carried supplies to a vessel frozen in the ice at North Cape, and returned with 1,100 pounds of white fox-fur valued at \$93,000. This was the first west-to-east flight over the Pacific Ocean, the Arctic Ocean and Bering Strait, and was made in a Hamilton metal monoplane.

Noel has escaped every danger but one. Tourists from the States, mistaking him for a bear, have fired at him and missed. But in May, 1929, Miss Ada Bering, daughter of the postmaster of Nome, became interested in him because at first glance he resembled a bearskin rug they had at home. Imagine her confusion when she found that he was inside and when he explained gently yet firmly that if she wanted the outfit for a rug she'd have to take him along with it, which she did. However, as it turned out, she never did get that suit for a rug because on April 4, 1930, they discovered that they'd have to cut the thing up into rompers for Noel Merrill Wien, who arrived that very day, without baggage.



**C**OLONEL Roy Kirtland, Commanding Officer of Langley Field, issues these instructions to officers just reporting to Langley Field from the Training Center:

"Gentlemen, you have just graduated from what is probably the best flying school in the world, and I have no doubt that each of you can do anything you want with an airplane. You have come to Langley Field for duty, and you are going to operate over terrain and under weather conditions which are entirely different from those found in Texas. If



Colonel Kirtland

you study these new conditions, use your head and go slowly, you will soon find that what you learned at the flying center was but a preliminary to what you will learn here. In this connection I have two things I wish to bring to your attention—the habit of using plenty of airdrome for your take-offs and having respect for bad flying conditions.

"The other day I was flying with one of my older fliers, and when I noticed that before taking off he went to the far side of our large airdrome I commented

upon the fact. He replied, 'Colonel, I believe that I am a good enough flier to use plenty of take-off.' Please remember his reply and always act accordingly. I have seen numerous planes take off from the middle of the field or from one-third of the field, and seen the plane go over the windward boundary at a height of one or two hundred feet—a perfectly safe height as long as your motor doesn't stop. I hate to think of the number of crashes we have had because the motor did stop, and of the funerals I have attended because the pilots couldn't land straight to the front and tried to turn back into the field at too low an altitude. We have too few pilots and too few airplanes to be able to afford to lose one just because a pilot could not spare a moment or two additional for taxiing down to the far side of the field. In active service, or in the use of emergency airdromes, you will have plenty of time to indulge your propensities for taking short runs; at other times always use all the airdrome you have, and in later years you will be glad that you did.

"Now for point two: In time of peace, and when nothing is pressing, don't take off when weather conditions are dangerous. Many a good pilot has crashed in clouds or fog because he didn't have the moral courage to say, 'No, I won't take off. The conditions are too poor.' We take it for granted that all pilots have sufficient physical courage to fly in bad weather; and I wish that I could believe that all pilots had sufficient moral courage not to fly in dangerous weather. If you will follow my advice, you will live to see the signs of increased rank on your shoulders; if you don't, I may have to send you flowers which I can ill afford and which you won't be able to appreciate."

If Colonel Kirtland's sound advice, founded as it is on his many years of experience and observation, could be imprinted on the mind of every American civilian pilot, the safety record of American aviation would be advanced immeasurably. However, in the words of the poet—a bloke named Anonymous:

He remarked as he left Tallahassee,  
"Fair weather flying's so *passé*!"  
He took off in a haze,  
Flew along in a daze,  
And exclaimed as he crashed, "How *déclassé*!"

But after they'd patched up his plane  
He took off once more in the rain,  
Lost his way in the fog,  
Lit and stuck in a bog,  
But declared, "I shall try it again!"  
Despite this succession of knocks,  
Concussions and cerebral shocks,  
He spun through a low  
From a hundred or so  
And completed his trip in a box.

Famous last words: "Hop in—I've no time to wait for a weather report."

## Call These Members

**ALABAMA**  
Birmingham, Birmingham Flying Service, Inc.

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**CALIFORNIA**  
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Indianapolis, Central Aeronautical Corp.

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Cedar Rapids, Cedar Rapids Airways, Inc.

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**MASSACHUSETTS**  
Leominster, Fitchburg & Leominster Airways

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Battle Creek, Duplex Air Service  
Detroit, Wm. B. Maycock  
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Sandusky, Parker Brothers Airways

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Tulsa, D. A. McIntyre

**OREGON**  
Portland, Portland Airways, Inc.

**PENNSYLVANIA**  
Duncansville, Paul Peterson  
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**TENNESSEE**  
Johnson City, Appalachian Flying Serv., Inc.  
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Knoxville, Knoxville Aero Corporation

**TEXAS**  
Dallas, Dallas Aviation School

**VERMONT**  
Battleboro, Reed Whitney Flying Serv., Inc.

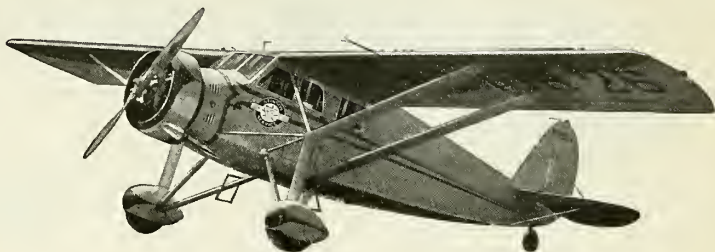
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Casper, Wyoming Air Service

# Learn to Fly—In the Plane You Will Eventually Buy



4-PASSENGER 215 H. P. STINSON MODEL "S"  
\$495.00 f. o. f. Wayne, Mich.

THIS EMBLEM  
IS YOUR  
PROTECTION



Look for it on the  
planes you hire for  
air taxi trips and  
flight instruction.

## IT'S FUN TO FLY THE STINSON

You and your instructor sit side by side in a completely enclosed cabin plane (no California tops) amid surroundings you are accustomed to in everyday life. The cabin is smartly upholstered—its deep cushions comfortable. Wheel controls (same as your automobile) are used. No special flying togs or goggles necessary in these MODERN PLANES.

Your instructor talks to you in normal tones. You are away from the propeller's stinging, noisy blast. Stinson planes are easy to operate, stable and rugged. They are powered by the world's champion Lycoming motor.

## MAKE YOUR NEXT TRIP BY AIR

These planes are available for cross-country taxi trips. You may charter these planes at low rates and fly fifty miles or five thousand miles. You reach your destination quickly—attract attention to yourself or your business. Travel by air is liquid motion. There is no sensation of speed or height. You float easily along.

Members of the Stinson Air Cab Operators' Association are listed in the column at the left. Call the one nearest you—let him quote you on your next business trip. His planes can carry one, two or three passengers and baggage.

FLYING FIELD OPERATORS using Stinson Lycoming powered cabin planes are invited to join the association. For complete information write the Secretary—

**STINSON AIR CAB OPERATORS' ASSOCIATION**  
WAYNE, MICHIGAN

# THE AIR SERVICES

## Scott Field Improvements

AN extensive building program has been begun at Scott Field, the Army's chief lighter-than-air field, located near St. Louis, Missouri. It is expected that under present plans the field will become one of the best ports of its kind in the world.

The program contemplates the ultimate abandonment of all present frame barracks and other wooden structures, erected during the World War, and their replacement with modern brick buildings. The present building plans, according to officers at the field, were made possible by an appropriation of \$300,000 by Congress last year. Measures are pending in Congress, calling for the appropriation of \$2,767,000 for new housing and \$1,155,000 for technical and replacement buildings at the field.

Among the new projects planned are a new central heating plant, a new hangar, headquarters and operations offices, improvement of landing field and building area, concrete aprons, gas plant and chemical storage, photo building, radio building and an up-to-date machine gun range.

Purchased at a cost of \$119,643, Scott Field today represents an investment of several millions of dollars. The field was originally a heavier-than-air training base, but in 1920 the Government converted it into a lighter-than-air field, although even now a squadron of heavier-than-air planes is still stationed there.

The central feature of the field is a mammoth hangar, 810 feet long, 150 feet wide and 150 feet high, capable of housing the dirigible, *Akron*, the world's largest air liner. The structure covers 11 3/10 acres of ground and cost a total of \$1,210,000.

An average of 450 enlisted men and forty officers are quartered at the field, which is under the command of Col. John A. Paegelow, who was in charge of balloons in France during the World War.

## Officers Assigned to School

THIRTY Air Corps officers will attend the next class at the Air Corps Tactical School, Maxwell Field, Ala., according to recently issued special orders of the War Department. These officers are to report to the commandant of the Tactical School not later than Sept. 5, 1932, for duty as students in the 1932-33 course.

## "Macon" Framework Half Completed

WITH the after half of the framework of the *Macon* practically completed, construction on the forward half of the dirigible was started last month at the Goodyear-Zeppelin Corp. Work on the fabric covering was expected to begin about May 1.

## "Akron" Officers' Smoking Room

THE gun room in the after end of the control car of the *Akron* was converted into the officers' smoking room last month. A smoking room for the crew will be assigned in the emergency control room. Heretofore strict regulations have prohibited smoking aboard the *Akron*.

## Navy Receives Flying Boat

THE XP2Y-1, an experimental type of flying boat built by the Consolidated Aircraft Corp. of Buffalo, N. Y., was delivered at the Naval Air Station, Anacostia, D. C., on April 17, having covered the distance overland from Buffalo to Washington in three hours and ten minutes.

## Proposes New Naval Base

A NEW auxiliary Naval dirigible base would be created from 2500 acres of the Fort Lewis, Wash., military reservation in a Bill Senator C. C. Dill of Washington recently introduced at the national capital, requesting the transfer by the War Department of this amount of land for the purpose. The base, located near Tacoma, has been approved by Admiral William A. Moffett, Chief of the Bureau of Aeronautics, and other high Naval officers.

## Douglas Amphibion for Hawaii

THE second of three new Douglas amphibions, the latest type to be approved for use in the Army Hawaiian Department, was assembled and tested recently. The plane has been assigned to Wheeler Field, Honolulu.

An unusual feature of this plane is its water-tight cabin. Duralumin bulkheads and shatter-proof glass accomplish this construction.

Although it will carry nine persons at a high speed of 146 miles per hour, the twin 300-horsepower engines are highly economical in fuel consumption. When used as a commercial transport, this plane may carry ten or twelve passengers, depending on the cabin equipment, but when it is converted for military use, part of the available space is used for radio equipment, thus limiting its capacity to nine. It is designed for a pay load of 1,845 pounds, and the large fuel capacity and economical engines give it a wide cruising range.

## Changes at Sand Point Station

LIEUT.-COMMANDER GEORGE S. GILLESPIE, inspector of Naval aircraft at the Boeing Aircraft Co., has been promoted to the post of commanding officer at the Sand Point Naval Air Station at Seattle, Washington. John Perry, assistant to Lieut.-Commander Gillespie, will become inspector of Naval Aircraft at the Boeing plant, while Lieut.-Commander A. E. Montgomery, the present commanding officer of the Sand Point station, will be transferred on May 1 to the staff of the Commander of Aircraft of the Asiatic Fleet, joining the fleet, however, later in the year.

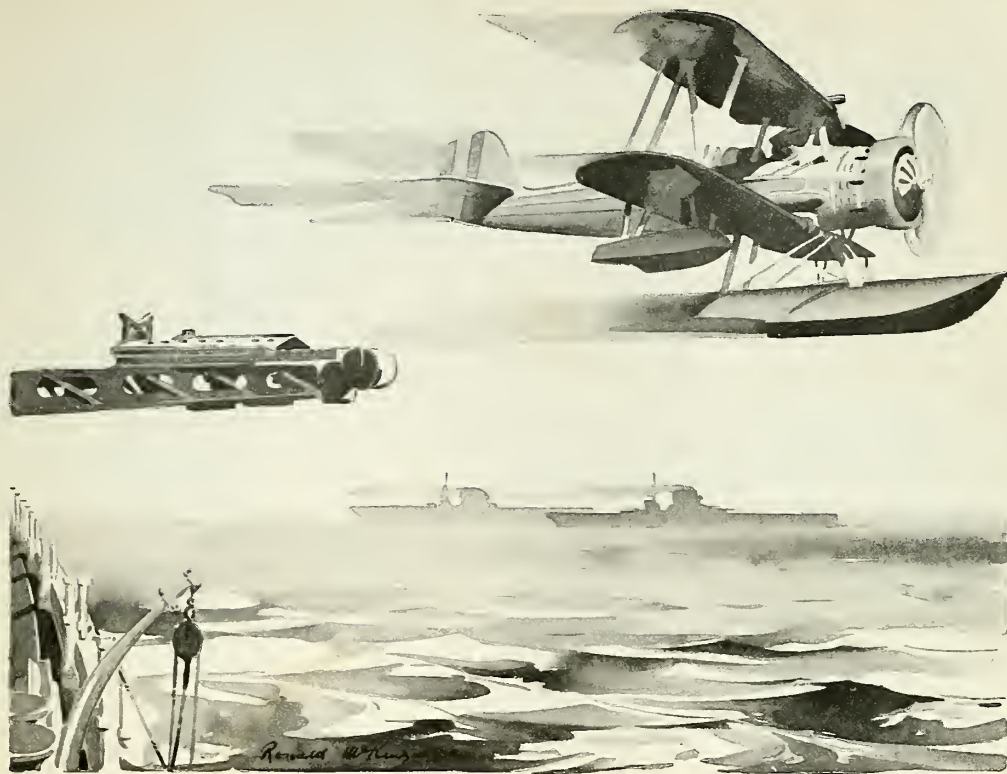
An appropriation for the installation of new landing lights at the Sand Point station is on the budget of the Navy Department, and work on them is to start soon. Admiral William A. Moffett, Chief of the Bureau of Aeronautics, has authorized the new lighting system.

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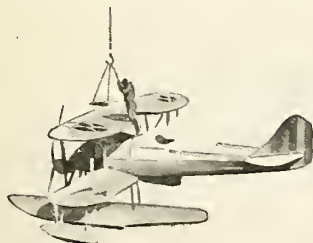


The Consolidated XP2Y-1, largest flying boat of the U. S. Navy

Acme Photo



*Out via Catapult  
..In via Sling.. and  
ready to go again..*



To win the approval of the U. S. Navy for observation work with the Battle and Scouting Fleets, an airplane must have speed, climb and maneuverability well beyond the severest requirements of commercial flying. Dependability and stamina are as basically necessary as engine and empennage. Flights that start on the catapult and end in the hoist sling are convincing tests of quality in design and structure. Because each of the series of new "Corsair" designs has passed all of these tests by generous margins, the Vought "Corsair" has long been the observation plane used on the Navy battleships and scout cruisers. Chance Vought Corporation, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation. Sole Export Representative: United Aircraft Exports, Inc., 230 Park Avenue, New York, U. S. A.

CHANCE VOUGHT



CORPORATION

(Continued from preceding page)

### Two-Piece Flying Suit

A PRODUCTION order has gone into effect, providing for a new two-piece flying suit for the Air Corps to replace the one-piece "monkey" winter flying suits. Horsehide is used for the outer covering instead of calfskin. This material has a non-scuffing feature and is less heavy and bulky and more flexible than the calfskin. The lining and collar are of lamb shearling, fur-tanned and electrified, a process by which curly wool is submerged in acid and made straight. The straight wool is smoother and softer in appearance and less irritating to the skin. Interlocking fasteners, used the entire length of arms, trouser legs and jacket front, facilitate donning and taking off the suit. Leakage of air through the interlocking fasteners is prevented by an overlapping arrangement of the fur. According to a test, this arrangement served to increase the warmth of the suit ten degrees. A specially designed collar, fitted close to the back of the neck and held in place by an elastic band attached to each side and extending over the head, provides snugness. Heavy elastic suspenders allow the shoulders to carry the trouser weight.

When the interlocking leg fasteners are open, the trousers may be laid flat. They are donned by putting the arms through suspender straps and zipping up the legs. There is no drawing up of the trouser legs, as with the flying suit that must be stepped into. If a pilot were flying into different climates, the trousers and coat could be worn with interlocking fasteners zipped up at the beginning of the journey and unfastened as the temperature grew too warm for comfort. The aviator may wear the jacket with lighter weight trousers or pair the trousers with other coats. Double protection is provided by the overlapping of trousers and jacket to a part of the body easily affected by cold. Together the two pieces weigh four pounds less than the one-piece type.

The two-piece flying suit is produced in a lighter weight garment also, suitable for fall and spring wear. This suit is of silk pile fabric after the same model.

### Air Depot Makes Deliveries

THE Middletown, Pa., Air Depot has inaugurated a "Delivery by Air Service," for the three major stations in the Middletown area, Langley, Bolling and Mitchel fields. Its purposes are: Facilitating the delivery of supplies such as can be handled in a transport plane, creating savings in transportation funds and in time of deliveries, eliminating labor involved in packing and crating of supplies, training personnel in the handling of supplies by transport, increasing the efficiency of pilots in flying fully loaded trans-

ports and affording them more cross-country experience and promoting greater efficiency in the operation of depot and station supply organizations.

A General Aviation Y1C-14, powered with a Wright Cyclone engine, is used as the transport plane. The dispatching of the transport and the assignment of pilots is under the direction of the operations officer. The depot supply officer regulates the quantity and nature of the articles transported and loads and unloads the transport at the depot.

Each station has detailed a crew for loading and unloading. They already have become familiar with the proper methods in handling supplies and engines. While 1,200 pounds is the usual maximum load to be carried on a trip, 1,400 pounds may be carried, if conditions warrant it. In cases where no return load is available at the station to which a cargo of supplies is carried, a repairable engine is taken aboard. Station supply officers have been instructed to arrange their shipments always to have a load of supplies or a repairable engine available for the transport to carry on its return journey.

Parcel post and express shipments to the three stations served have been practically ended. An assured weekly delivery has eliminated almost entirely emergency requisitions and should eliminate the necessity of voluminous quarterly requisitions.

### Mitchel Field Hospital

THE new hospital at Mitchel Field replaces the old wooden building previously used as a hospital and constitutes an important part of the \$3,000,000 reconstruction program of the field. It is a two-story brick building, costing \$125,000, accommodates twenty-five patients and contains the most modern and efficient equipment.

The first floor houses an eight-bed enlisted men's general ward, flight examination rooms, two dental rooms with a connecting laboratory and waiting room,

an X-ray room and a pharmacy, modern kitchen and mess hall and non-commissioned officer personnel quarters. On the second floor are located a surgical ward, officers' private and semi-private rooms, main operating rooms, sterilization room, laboratory and semi-public ward room, which can be used for women patients, and enlisted personnel quarters. The basement contains the prison ward, emergency operating room, first aid and sick call room and morgue, prophylaxis room, heating plant, supply office and vaults. Each ward has a radio from which choice of two programs may be had.

A unique system of silent signaling from the wards to the ward offices calls the attendant. The heating plant is automatic both in heat regulation and coal feed. A water-cooling system operates for all parts of the building. The eye examination room is one of the unique parts of the flight examination suite, being completely enclosed and having an ingenious arrangement of all eye-testing instruments.

### Major Davis at Washington

MAJOR James Edward Davis, in command of the United States Marine Aviation Squadron in Haiti, has been ordered to duty at Headquarters, Marine Corps, Washington, D. C. Major Davis had been on duty in Haiti since February, 1930, and received a letter of commendation for competition during the year 1930-31 from the Secretary of the Navy, when the squadron under his command, Observation Squadron 9-M, was awarded the aircraft gunnery trophy for observation planes.

### New Apparatus at Lakehurst

A NEW main mooring winch has been installed at the Lakehurst Naval air station. It develops a pull of 25,000 pounds on the mooring cable. The new experimental shock-absorbing device used with the main mooring winch also functions satisfactorily.



Wide World Photo

New Army Douglas observation plane, powered with 650-horsepower Conqueror engine





# UP and GOING

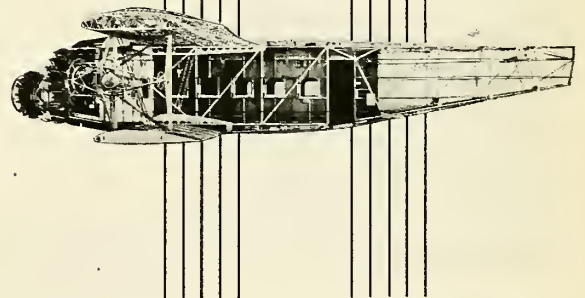
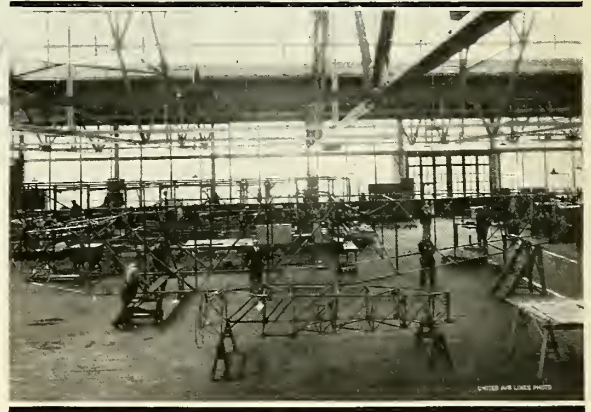
FROM ocean to ocean in a comparatively few hours—New York one day and San Francisco the next—the great transport plane, with its human cargo and its added burden of mail, must be sturdily framed as well as powerfully driven. It has, in fact, a marvelous frame. Every impulse of its tireless engines is sustained and communicated to the whole fabric, every wrench and bump of the resisting air is met, distributed, and balanced by the unimaginable strength of light tubular steel members.

The specialized character and unvarying uniformity of such tubing is a prime requisite to the perfection of flying. To have been a leader in the development of it is a matter of pride to the NATIONAL organization. More definitely, it is a matter of pride that the framework in actual use for scores of major transport planes on various lines is of NATIONAL-SHELBY—

*America's Preferred Aircraft Tubing*

NATIONAL TUBE COMPANY, Pittsburgh, Pa.

Subsidiary of United States Steel Corporation



NATIONAL-SHELBY Aircraft Tubing is made to meet United States Army and United States Navy specifications. Carried in stock by distributors at convenient points throughout the country and kept in separate, individual lots with which actual test reports can be furnished at the time of delivery. Inquiries may be addressed either to the manufacturer or to the nearest distributor.

# NATIONAL-SHELBY AIRCRAFT TUBING

# PARKS AIR COLLEGE CELEBRATES OVER 4,000,000 MILES OF SUCCESSFUL STUDENT-FLYING AT ITS OWN AIRPORT!



FOUR million miles is a great deal of flying. Such a figure might represent the yearly record of a great air-transport system. It takes on a special meaning when you realize that it has all been flown from one airport, during the past four years, in the daily routine of student-instruction.

In this, as in most other respects, Parks Air College is clearly the nation's outstanding aviation school. To meet the responsibilities of such leadership, Parks Air College maintains high and rigid

standards of performance . . . keys its methods to the latest technical progress . . . selects only most able instructors . . . rates the character and ability of students by an error-proof grading system . . . and uses \$700,000 worth of airport and equipment. With that background, can you wonder that Parks graduates are equal to any opportunity?



This book.. *amazingly interesting*  
.... gives you the complete picture

The full story of what is being done here is ready for you to read in the new 1932 edition of "Skyward Ho!" . . . a 40-page book, completely illustrated. It tells what you will find here . . . what you will do here . . . and why you will leave Parks equipped with the best possible preparation for the important positions which aviation offers to thoroughly trained men. If you are looking toward aviation as the field in which your efforts can carry you farthest, in the least time, "Skyward Ho!" has a message of tremendous importance to you. By all means get it!

*You are invited to visit and inspect* **PARKS AIR COLLEGE**

## PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Section 5 AD  
East St. Louis, Illinois

Get the new  
"Skyward Ho!" at once!

Read it carefully . . . make an intelligent decision in your choice of an aviation school. Use the coupon to request your copy of the book.

Send me "Skyward Ho!", with information about the course checked, for a young man of \_\_\_\_\_ (Age)

Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

- Executive Transport Pilots' Course
- Transport Pilots' Course
- 28-week Executive Aviation Course
- Limited Commercial Pilots' Course
- Airplane and Engine Mechanics Courses

## PARKS AIR COLLEGE INC. . .



OLIVER L. PARKS, right, inspecting Lockheed plane changed over from high pressure tires to Goodrich Low Pressure Silvertowns.

# World's Largest Flying School uses Goodrich *Low Pressure Tires exclusively*

PARKS AIR COLLEGE, the nation's largest commercial flying school, flies some 900,000 miles—averages 120,000 take-offs and landings yearly. They have flown more than 41,000 hours of student instruction—more than four million miles—with a perfect safety record. Mr. George E. Bounds, Director of Sales, wrote us recently:—

"I want you to know that the Goodrich

Tires, used on the planes here at Parks Air College, have been largely responsible for this perfect safety record. Prior to the use of your tires we had an average of three broken axles a week, with equally as many propellers smashed. Goodrich Low Pressure Tires have reduced breakage of propellers 75%, while the replacement of landing gears has been very small.

"We find it an easy matter now to take off after forced landings with no damage to property. The installation of these tires has saved this school thousands of dollars

. . . . Goodrich Low Pressure Tires have outlasted all previous equipment."

Goodrich *Low Pressure Tires* are the first choice of airmen everywhere. On any plane they make take-offs and landings safer . . . easier. In any size they afford the highest quality with minimum weight. A set of Goodrich *Low Pressure Tires* can easily and quickly be installed on *your* plane, with or without brakes.

See your nearest Goodrich Dealer or write to the Aeronautical Division of The B. F. Goodrich Rubber Company, Akron, Ohio or Los Angeles, California, for further information.

*A line-up of training ships at Parks Air College where Goodrich Low Pressure Tires are used exclusively.*



# Goodrich *Airplane Tires*

Another B. F. Goodrich Product



Over 40 rubber products for airplanes • Silvertown Tires • Tail Wheels  
Hose • Tubing • Engine Mounts • Crash Pads • Matting • Accessories

# TRAINING METHODS AT PARKS AIR COLLEGE

By Thomas W. Parry, Jr.

**T**HE first time young Locksby soloed, everyone at Parks Air College agreed that he was a "natural," a sort of "born flier." Without the slightest hesitation, he took off easily, climbed gently and soared above the airport of the college near East St. Louis, Ill., for twenty minutes. Then he came in for a perfect landing with all the effortless grace of a seagull.

Yet Locksby, who had left the office of Oliver L. Parks, president of the college, just before I arrived there, was back in the dormitory packing his bags. He was going home. Aviation was not for him.

"Why on earth did you advise that man to leave?" I asked Mr. Parks. "I understand he was one of the best student pilots ever enrolled in your transport course."

"He was," Mr. Parks replied, "a perfect 'natural' when it came to flying a plane. But he lacked some of those other qualities which are essential to the aviation mechanic, pilot or executive in the aviation industry. Locksby's classwork wasn't up to stand-

ard, for one thing. His attitude toward his instructors and fellow students was not conducive to progress in the aviation industry. Locksby never did anything serious around here, but he was rather consistent in his violation of minor regulations. And he resented the fact that he had to complete a stipulated amount of 'worktime.'

"Those points may seem inconsequential to you and other laymen, for naturally you regard an aviation college as an institution where men should be taught to fly—and nothing else. But this college holds other considerations as equally important as ability to fly. A student may be the greatest pilot in the country, but he can't graduate from Parks Air College unless he develops other traits of character which are paramount in the safety and reliability of aviation.

"Locksby is not the first apparently good pilot I have advised to give up the aviation business and get into some other industry. Since its establishment, Parks Air

College has graduated approximately 1173 students and expelled 274. By expelling those students we have cut from our gross revenue approximately \$150,000, but we have maintained a standard upon which this college prides itself. Parks Air College has endeavored to graduate men who will be safe pilots at all times, alert and level-headed in emergencies, men whose first consideration always will be for their passengers, and executives whose clear thinking and sound judgment will contribute to the industry's growth.

"Don't misunderstand me. A man must also be an excellent pilot before he can be graduated from our transport or limited commercial course. But you can see now that a man must be much more

(Continued on page 56)



More hours added to the log



Parks Airport from the air. Above, Oliver L. Parks, founder of Parks Air College

# FOUR MILLION MILES *with* SHELL



Major James A. Doolittle, in charge of the Aviation Department of the Shell Petroleum Company, with Oliver L. Parks, President of Parks Air College, Inc.

Shell has earned this sweeping endorsement by the nation's leading commercial school. Shell has been responsible for the development of many leading aeronautical enterprises. Its endorsement by pilots everywhere is concrete proof that you cannot buy a finer motor fuel for your plane.

## SHELL AVIATION SERVICE IN ST. LOUIS

Transient pilots, visiting St. Louis and East St. Louis, can secure Shell service at the Municipal Airport (Lambert-St. Louis Field) or at Parks Airport, East St. Louis, Ill.



Below — Members of the faculty of Parks Air College and a few of the advanced flight students.



In aviation, good equipment and the best of products prove their merit in the long run. For 4 years, Shell Gasoline has been used exclusively by the nation's largest flying school. 300,000 gallons of Shell Gasoline have been responsible for 4,000,000 miles of successful student instruction. Read Oliver L. Parks' letter to "Jimmie" Doolittle. It speaks for itself.

**PARKS AIR COLLEGE, INC.**  
PARKS AIRPORT  
EAST SAINT LOUIS, ILL.

April 7th, 1932.

Major James A. Doolittle  
Shell Petroleum Company  
Saint Louis, Missouri.

Dear Major:

4,000,000 miles of successful student instruction with Shell Gasoline, is a great deal of flying time. Such a figure might represent the yearly record of a great transport system. It takes on special meaning when you realize that it has all been flown from one airport during the past 4 years in the routine of daily student instruction.

In this, as in most other respects, Parks Air College is clearly the nation's outstanding school, and it contributes a large measure of its success to Shell Gasoline, which has been used exclusively during the past 5 years of our operation. To meet the responsibilities of leadership in our field of endeavor, Parks Air College maintains high and rigid standards of performance - it keys its methods to the latest technical progress - selects only products of outstanding merit.

The best quality is none too good for Parks students. Parks graduates realize, through their experience in this school, that Shell Gasoline means countless miles of "Happy Landings". They can always depend on Shell for a carefree take-off. It is definite proof of dependability, of superior qualities in motor fuel. The same qualities aviation demands of its pilots.

The entire student body and the thousands of graduates of this institution salute you for your remarkable achievements in aviation. We praise the product you represent to the utmost of our ability.

Very truly yours,

*Oliver L. Parks*  
Oliver L. Parks,  
President

APPROVED BY U. S. DEPARTMENT OF COMMERCE AS A TRANSPORT GRADE





Kendall performance is one of the outstanding achievements of the aviation industry. Each year at the National Air Races, Kendall has been in more winning places, by several times over, than all other oils combined. And now in day-in-and-day-out service of the most gruelling kind—Kendall again demonstrates its extraordinary quality. That's why the Parks Air College is able to announce the remarkable record of "a million miles without a motor failure . . . thanks to Kendall!"

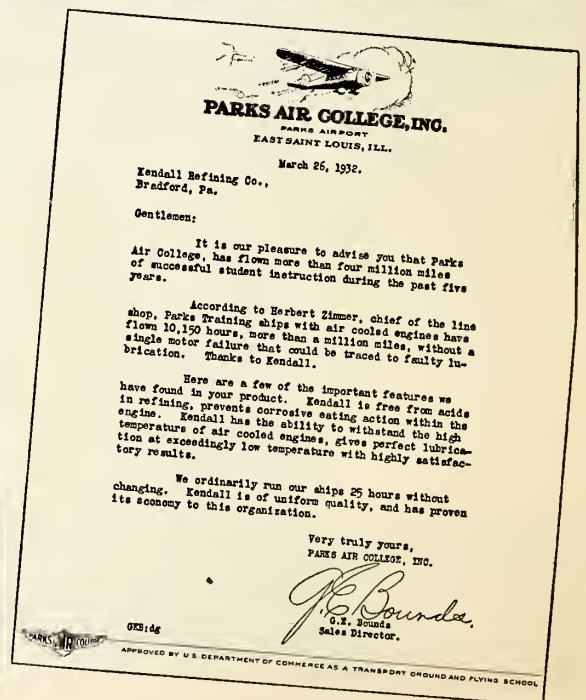
Such performance records are possible with Kendall because every drop of it is made from 100% Bradford Grade of Pennsylvania Oil—the finest and costliest in the world. Not only are the most modern refining methods used, but several extra processes specially developed by Kendall, give it the supreme quality that accounts for its marvelous ability to perform.

Kendall is available at all important air ports.

KENDALL REFINING COMPANY • BRADFORD, PENNA.

**KENDALL**  
THE 30 HOUR OIL

MERELY MAINTAIN THE PROPER OIL LEVEL





Virgil Fichter, owner and operator of Inter Cities Air Lines serving Northern Illinois, using a fleet of Stinsons. . . Fichter is a recent graduate of Parks Air College.

# STINSON

## The Choice of PARKS' GRADUATES



Oliver L. Parks congratulates John E. Faresman, President of Wolf Flying Service, Inc., Williamsport, Pa., winner Parks' Graduates Reunian Race, using a 4-Place Stinson.

Good pilots require good airplanes—that's why Stinson is the universal choice of Parks' graduates. From New York to California, from Canada to the Gulf, graduates of the World's Largest Flying School have selected Stinson to help them achieve success in commercial aviation.

Parks' graduates realize that Stinson offers the utmost in closed cabin comfort and inherent stability. They realize that the vast production resources, strength, experience and great buying power of

the Stinson Aircraft Corporation are concentrated on the building and marketing of better planes at new radically low prices. Parks Air College applauds Stinson's success in making air transportation practical and safe—and placing it within the reach of thousands who have been waiting for it.

A few of Parks' graduates who have purchased planes are as follows:

Virgil Fichter, operating Inter Cities Air Lines—three 4 Place Stinsons. John E. Faresman, President of the Wolf Flying Service, Williamsport, Pa. Sanford E. Liddle, Manager of Liddle Airways, Schenectady, N. Y. Earl Ricks, Stamps, Ark. Richard McMakin, Big Ben Beverage Co., Chicago, Ill.—together with many others who believe in Stinson first, last and always.

Parks Air College represents Stinson. It has been successful in placing a large number of craft with graduates from its various classes.



Sanford Liddle, transport graduate of Parks Air College, owns and operates Liddle Airways, Schenectady, N. Y. Uses Stinson Monoplanes.



**STINSON AIRCRAFT CORPORATION**  
Division Cord Corporation • WAYNE, MICHIGAN

More Than Ever "The Aircraft Standard of the World"

(Con. from p. 52)  
than a good pilot to measure up to the requirements which the industry must set.

Mr. Parks then told me something of the training which men receive at this university of the air, the largest in the world. Parks Air College is training men, as well as pilots for the infant aeronautical industry which is going to play a leading role in the business and industrial life of America during the next decade.

"We intend to do everything in our power to help the student who really wants to succeed and make good in life," Mr. Parks continued. "But the student who will not take a personal interest in himself and the school is not wanted at Parks Air College, and his expulsion will soon occur.

"Parks Air College men are heading for a definite goal. They are fitting themselves for the high places in aviation." Mr. Parks described the four cardinal points upon which a student at the air college is graded, and his grades determine the nature of the recommendation which will go with him to his future employer. The points are as follows:

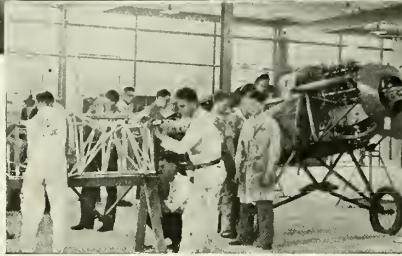
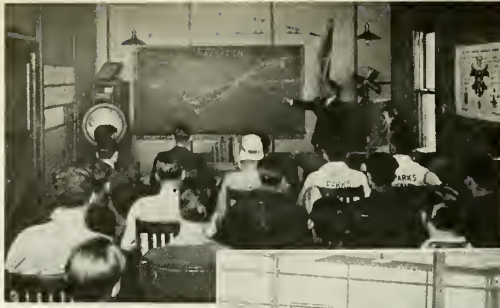
1. His appearance, personality and attitude toward life, as reflected in his everyday actions, his deportment on the field and in particular his record for orderliness and good conduct in the student dormitory.

2. His performance of the worktime privilege, with special reference to the industry he shows and the cheerfulness and efficiency with which he performs whatever tasks that may be assigned to him from time to time.

3. His scholastic grades in theoretical instruction given either in the mechanics' or pilots' schools.

4. His grades in flying or in shopwork, with special stress laid on the judgment and common sense he shows either at the controls of the airplane or in the performance of his routine duties while a student mechanic.

"Consideration on the part of a student



Navigation lecture and school shop

toward his fellow students," Mr. Parks continued, "a fair amount of courtesy in his community life and diligent attention to his instructors cannot but bring him the highest recommendation.

"But it must be remembered that this college places prime importance upon the student's general attitude. Any other method of grading would be unfair to the future employer, as it would not give the fullest information possible. It is a pertinent fact that the most successful graduates were orderly, conscientious residents of the student community."

Parks Air College, situated but twenty minutes from the downtown district of St. Louis,



Parachutes used for aerobatics

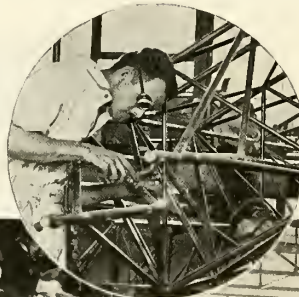
is offering instruction in courses required by every branch of the aviation industry. The curriculum includes an executive aviation course, executive transport pilots', transport pilots' and limited commercial pilots' courses, an airplane and engine master mechanics' flight course

and airplane and engine ground service mechanics' course.

Such subjects as meteorology, navigation, air law and radio are covered thoroughly. Students are schooled in the design and proper use of parachutes and made familiar with the various instruments important in navigation.

What is considered one of the most constructive forward steps ever taken by the college is the recent inauguration of an executive aviation course of twenty-eight weeks, for men who are already or will become transport pilots.

"This is distinctly a course for the man who realizes that this generation will see transportation's greatest development in the air," Mr. Parks explained. "It was inaugurated for the man who is deter-



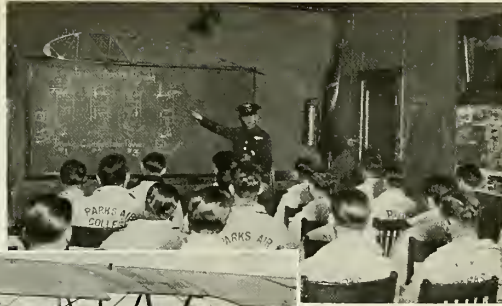
Students receiving instruction on engines, fuselage welding and the rigging of completed ships



mined to play his part worthily in that triumph."

"The theme of the course is the application of flying to business and of business methods to aviation. In twenty-eight weeks of intensive work it covers air transport operation, operations management, personnel selection, economics of airline location, airport design and management, public speaking, salesmanship, advertising, sales promotion and aircraft radio equipment."

Twelve department heads, with a number of experienced instructors under each, comprise the forty-five members of the personnel of Parks Air College. To the interest and enthusiasm of these twelve department heads



Final inspection and engine lecture

Mr. Parks attributes much of the success of the school he has founded.

The fact that the college opened 1932 with approximately 150 students, the largest enrollment of any January in its history, is indicative of the place the flying school occupies

Glass, Night Flying Instructor; Frank Wallower, Flying Instructor; Henry Schnittger, Field Manager; Herbert Zimmer, Chief Master Mechanic; L. H. Shedenhelm, Line Mechanic; Fred Miller, Flying Line Service; Paul Schmolke, Mechanics Instructor; Russell Hewitt, Mechanics Instructor; Charles McMillen, Mechanics Instructor; and Herbert Rehmert, Line Service Mechanic.

The executive transport pilots' course requires nearly two years to complete. It is equivalent to four years of college and includes, in addition to qualifying its students for transport licenses, twenty-eight weeks of executive training for air transportation as a business career. Two hundred twenty hours of flight instruction, thirty weeks of airplane and engine mechanics training and eleven weeks of work in a transport pilot's ground school make up the major part of the curriculum.

Fifty hours of flying and a complete course in transport pilots' ground school instruction are features of the limited commercial pilots' course. The ground school comprises instruction regarding engines, airplanes, meteorology, navigation, air law regulations and aircraft accessories. This curriculum also includes thirty weeks in the airplane and engine mechanics' school.

The course for airplane and engine mechanics also may be taken separately. It comprises 1,050 hours of intensive instruction, eighty per cent of it being practical shop work and only twenty per cent of it requiring classroom study.

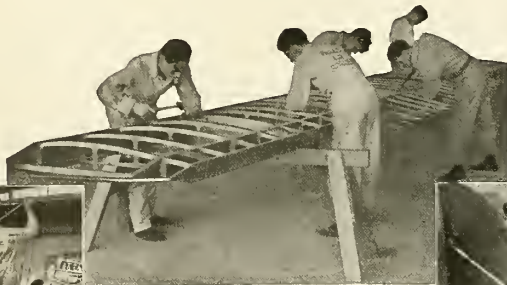


Preparing for instruction flight

in the industry which is destined for such rapid progress.

Students in the college live in a \$60,000 dormitory, comfortably furnished and as neat as that of a leading military school. Just across from the dormitory is the airport cafeteria, where Parks' students and instructors have their meals daily. Adjoining the cafeteria is the building which contains the offices and the personnel officer, who keeps detailed records of the students' work and is always ready to consult with them on any problem which may be confronting them. Among the other structures on the 100-acre airport are five large hangars, line shops, airplane and engine mechanics' school building and administration building.

Since its establishment, Parks Air College has had students from every state in the Union, from Canada, Alaska



Students rigging a Parks P2 biplane, and repairing wing panels as a regular detail of ground school instruction



and a score of foreign countries. Many of them today are occupying high posts in the aviation industry.

In the "Foreign Legion" of Parks Air College training has been given to students from Austria, China, Cuba, Peru, Po-

land, Siam and Sweden.

Member Aeronautical  
Chamber of Commerce



Manufacturer of Progress-  
ive Aircraft Finishes

## "THERE IS NO SUBSTITUTE FOR BERRYLOID"

SAYS OLIVER PARKS, FOUNDER OF

### PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Thank you, Mr. Parks, for your frank and unsolicited tribute to Berryloid. As founder of one of the twelve certified repair depots in the United States, possessing one of the nation's finest dope rooms, your high opinion of Berryloid is particularly gratifying to Berry Brothers. That Berryloid finishes are used exclusively in your school, and their proper use taught to hundreds of young men annually, is an endorsement that the aviation industry will heed and respect. We will undertake, in the future as in the past, to serve you, and the other great airports, schools and manufacturers of the country with every speciality the progress of flying requires.

**BERRY BROTHERS**  
PAINTS · VARNISHES · ENAMELS · LACQUERS  
DETROIT, MICHIGAN      WALKERVILLE, ONTARIO

## REDUCED PRICES !!!

**Johnson Pilots' Log Book No. 12**

Pocket Size, 3½" x 5¾"

**Black Genuine Leather Cover**

Was \$1.00 **Now \$ .75 each**

*Postpaid when payment  
accompanies' order*

Your Name in Gold Letters, 25c Extra

*Johnson Log Books for Pilot, Aircraft or Engine*

Meet All Dept. of Commerce Requirements

*Write for Our New Catalogue*

**JOHNSON AIRPLANE & SUPPLY CO.**

Dayton Airport, Dayton, Ohio

The airplane and engine master mechanics' flight course gives twenty-two hours of flight and ten hours of ground training besides a thirty-week mechanics' training and sixteen weeks in a post-graduate master mechanics' course.

The transport pilots' curriculum is especially designed for the student who wants to qualify himself for a transport pilot's license in the shortest possible time. It includes 200 hours of flight instruction and eleven weeks of work at the pilots' ground school.

All these courses allow for a stipulated amount of practical work time, for which a deduction is made from the tuition.

Men who know Oliver Parks believe that the success of his students is due to his own vision. In the regulations and maxims set down by Parks Air College for its student body is seen a reflection of the character of the man who founded the school six years ago and has built it to its present position. Mr. Parks requires more of himself than he does of any of his personnel or students. He arrives at his office before eight o'clock every morning and attacks each problem with confidence and enthusiasm. That has characterized his work ever since he came to St. Louis more than ten years ago.

Four and one-half years ago, Mr. Parks saw the urgent need for a commercial flying school that would build discipline, character, trustworthiness and loyalty into its students, a school whose graduates would be in demand by every reliable operator. That was the goal which he set out to achieve and toward which he has consistently advanced.

All signs point to the fact that aviation is just now on the threshold of an enormous expansion. The next six months is going to see more progress in airline operation and volume than in the entire history of commercial aviation, and the reason is clear. Ships have been announced that cruise 180 miles an hour instead of 90 or 95—and do it with *same engine* formerly required for *half that speed*.

A pilot receives the same pay for flying 180 miles an hour as for flying 90—the engine uses no more gasoline or oil—and as the ship will fly twice the distance in the same time, or the same distance in half the time, operating costs are thus cut in half, and transportation rates already are dropping.

What does this mean? It means that millions will fly who now do not because of high costs. It means increased activity throughout the aviation field. It is coming now, with a swelling volume as surely as railroads and the automobile came, but faster.

## LARGEST AIR COLLEGE USES LEE SUITS EXCLUSIVELY—



Students at  
Parks Air Col-  
lege, and prac-  
tically all fliers  
and ground  
men wear Lee  
Unlon-Aills and  
Lee Flying  
Suits.

**THE H. D. LEE  
MERCANTILE  
COMPANY**  
Kansas City, Mo.  
South Bend, Ind.  
Trenton, N. J.  
Minneapolis, Minn.  
San Francisco, Cal.

# --Out---Zip--Open!---with his *Instant* IRVIN



—with such safety

PARKS AIR COLLEGE

flies 4,000,000 miles

This is a great deal of flying. Such a figure might represent the yearly record of a great air transport system. It takes on special meaning when you realize that it has all been flown from Parks Airport during the past four years in the daily routine of student instruction. Parks Air College maintains high and rigid standards of performance. IRVIN Air Chutes have played a big part in this outstanding school's success.

Photo by Parks Air College

**FLASH**—snaps the “rip cord” in the sun. You see it clearly as his right hand barely completes the natural circle swing of pulling it—yet his Irvin Chute is out! It’s rising. He’s falling—the suspension lines are seen sliding freely out of the packing loops. He is off to another smooth and perfect jump.

JUST SO, in their parachute training, have other students at Parks Air College used their Irvin Air Chute equipment time and again. That this notable school, in upwards of four million miles of successful flying, has not had to use a chute in emergency, is a high tribute to its careful methods. That every student there, throughout his course, is equipped with an IRVIN, speaks for its forhanded thoroughness. Whether in training or out, wherever men take to the air, confidence flies with IRVIN. Ask your dealer or write for the new prices—

More Than

**600**

Lives Saved



IRVING AIR CHUTE CO., Inc.

1670 JEFFERSON AVENUE, BUFFALO, N. Y.

West Coast Factory and Office: 1500 FLOWER ST., GLENDALE, CALIF. Canadian Factory: FT. ERIE, ONT.

# IRVIN AIR CHUTES

*“The Life-Preserver of the Air”*

HARRISON-RIPPEY  
ADVERTISING COMPANY



ARCADE BUILDING  
SAINT LOUIS

March 24, 1932

Aero Digest,  
220 W. 42d St.,  
New York, N.Y.

Gentlemen:

On the principle of delivering bouquets while the recipient can enjoy them, it seems fitting that we tell you something about the job Aero Digest has done for our clients, Parks Air College.

That school has held for some time a pre-eminent position in its field. Those who watch aviation school advertising will have observed that Parks copy has consistently appeared in Aero Digest throughout the school's existence.

The reason is obvious: advertisers go where results can be obtained. Over the last five years, Aero Digest has out-pulled everything else on the list in closures; and closures are what count. There have been months in which Aero Digest pulled half, or close to half, of all returns secured.

How do you like that? Well, it's deserved.

Yours cordially,  
Harrison-Riphey Advertising Co.,

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EKH/EB



## "BIRDS OF A FEATHER . . . ."

Month after month, every year, Parks' advertising has appeared in this publication.

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AERO DIGEST is the most successful aviation school medium because it is the only one which provides the advertiser with a large newsstand distribution. Not only does this large, national newsstand sale bring new students to Parks and other schools, it also brings new potential buying power to the aircraft industry.

# AERO DIGEST

# RECENT AERO PATENTS

**T**HE following patents of interest to readers of *AERO DIGEST* recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N.W., Washington, D. C., at the rate of twenty cents each. State patent number and inventor's name when ordering.

Aerial vehicle. Carlo Cohen-Venezian, Turin, Italy. (1,847,173)

Variable-pitch propeller. Paul E. Glafcke, Denver, Colo. (1,847,180)

Airplane. William F. Neubeck, New York, N. Y. (1,847,222)

Landing carriage for high-speed airplanes. George L. R. J. Messier, Montrouge, France. (1,847,491)

Reversible variable-pitch propeller. Guy Thomas, San Antonio, Tex. (1,847,502)

Landing flare and releasing means therefor. Samuel Wiley, Metuchen, N. J. (1,847,545)

Airplane stowing apparatus. Lytle S. Adams, Seattle, Wash., assignor to Aeroplane Hangar & Equipment Corp., Buffalo, N. Y. (1,847,549)

Seadrome or airplane landing. Noah B. Brayman and Arminio Folino, Rochester, N. Y., assignors to International Aerodrome & Seadrome Corp. (1,847,551)

Metallic construction for aircraft and the like. Charles W. Hall, Buffalo, N. Y. (1,847,559)

Airship mast. Heinrich Strieffler, Landau, Germany. (1,847,634)

Airplane engine. Max O. Griffith, Cincinnati, Ohio. (1,848,008)

Aircraft control surface control. Harold D. Hoekstra and Evert C. Hokanson, Glendale, Ohio. (1,848,013)

Airplane. Fred E. Weick, Hampton, Va. (1,848,037)

Helicopter. Walter A. Bluhm, Chicago, Ill. (1,848,306)

Aircraft. Carlo Cresci, Merced, Calif. (1,848,321)

Rotatable hangar for airships. Otto Krell, Berlin-Dahlem, Germany. (1,848,360)

Airplane wing. Fred D. McMaster, Danville, Ill. (1,848,368)

Airplane refueling device. James G. Moran, Martinez, Calif. (1,848,372)

Aircraft, especially aircraft of the direct-lift amphibion type, and means of constructing and operating the same. Igor Sikorsky, Nichols, Conn., assignor to Sikorsky Aviation Corp., Bridgeport, Conn. (1,848,389)

Aircraft wing construction. Igor Sikorsky, assignor to Sikorsky Aviation Corp. (1,848,390)

Rotatable hangar for lighter-than-air ships. Charles E. Glessner, Portland, Ore. (1,848,472)

Aircraft. Edward B. Wilford, Merion, Pa. (1,848,555)

Aerial photographic mapping. Izak Boer, Arnhem, Netherlands. (1,848,558)

Variable-pitch propeller. Natalino Mattacchione, Wilson, Pa. (1,848,573)

Construction of airplanes. Roy B. Scroggs, Eugene, Ore. (1,848,578)

Propeller wheel for aircraft. Lucian M. Foster, Troy, N. Y. (1,848,705)

Flying machine. Alexander Soldenhoff, Zurich, Switzerland. (1,848,752)

Airplane. Ralph H. Upson, Red Bank, N. J. (1,848,809)

Mooring for airships. Patrick J. Griffin, Boston, Mass. (1,848,828)

Airship. Lionel M. Woolson, Detroit, Mich., assignor to Packard Motor Car Co. (1,848,921)

Helicopter. Charles E. and William G. Hicks, Mechanicville, N. Y. (1,849,007)

Screw propeller (variable-pitch). Victor Loughheed, Washington, D. C. (1,849,012)

Helicopter. Clifford Kibbe, Tracy, Calif. (1,849,235)

Airplane. Adelard Marsan, Bondsville, Mass. (1,849,547)

Airplane. John McK. Ballou, Forest Hills, N. Y., assignor to Merrill Aircraft Co., Dover, Del. (1,849,652)

Wing or airfoil for aircraft. Edmund D. Cairns, New York, N. Y., assignor to Cairns Development Co., Wilmington, Del. (1,849,740)

Airplane. Cecil E. McGuire, Douglas, Ariz. (1,849,766)

Airship. Robert J. McLaughlin, Manhattan Beach, N. Y. (1,849,943)

Re-enforcing for parachute shroud cord. Stanley Switlik, Trenton, N. J., assignor to Switlik Parachute & Equipment Co. (1,849,965)

Airplane parachute. John A. Barber, Olean, N. Y. (1,849,970)

Airplane. Harold A. Hicks, Detroit, Mich., assignor to Ford Motor Co., Dearborn, Mich. (1,850,011 and 1,850,012)

Auxiliary propeller for aircraft. Alexander Altieri, Philadelphia, Pa. (1,850,066)

Radio goniometric direction-finding device for airplanes. August Leib, Berlin, Germany. (1,850,080)

Aircraft. Michael Watter, Hartford, Conn., assignor to Chance Vought Corp. (1,850,251)

Airplane construction. Jack E. Foster, Alliance, Ohio. (1,850,263)

Airplane propeller. John F. Fritz, Evergreen Park, Ill. (1,850,452)

Airport. Errold G. Bahl, Los Angeles, Calif. (1,850,490)

Lubricating system. Joseph J. Boland, Keyport, N. J., assignor to Aeromarine Plane & Motor Co. (1,850,528)

Method of forming designs in the sky.

Willard Reed, Jr., Quantico, Va. (1,850,635)

Airplane lifting and driving device. William A. Fait, New York, N. Y. (1,850,711)

Device for braking airplanes upon landing. George L. R. J. Messier, Montrouge, France. (1,850,724)

Airplane. Trian Berbeck, Baltimore, Md. (1,850,786)

Aircraft. Otto Muench, Jacksonville, Fla. (1,850,890)

Rotating power drum for airplanes. Arthur J. Evans, Columbus, N. M. (1,850,925)

Airfoil. Trian Berbeck, Baltimore, Md. (1,850,954)

Airplane landing gear. Rex. E. Beisel, East Hempstead, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,850,964)

Helitractor (aircraft-propelling means). Bryant Chester, Beacon, N. Y. (1,850,993)

Screw propeller. Oscar Hermanson, New York, N. Y. (1,851,098)

Launching apparatus for aircraft. John D. Reardan, Dayton, Ohio. (1,851,129)

Fuselage construction. Joseph Ledwinka, Philadelphia, and Earl J. W. Ragsdale, Norristown, Pa., assignors to Edward G. Budd Mfg. Co., Philadelphia, Pa. (1,851,194)

Aircraft structure and method of making same. Earl J. W. Ragsdale, assignor to Edward G. Budd Mfg. Co. (1,851,211)

Securing device for aircraft coverings. Earl J. W. Ragsdale, assignor to Edward G. Budd Mfg. Co. (1,851,212)

Cover fastening for aircraft. John P. Tarbox, Philadelphia, Pa., assignor to Edward G. Budd Mfg. Co. (1,851,220)

Airplane. Leonard K. Cheswright, Swansea, Ont., Canada. (1,851,302)

Catching device (mail receiver). Roy Fisher, Los Angeles, Calif. (1,851,305)

Supporting means for aircraft-sustaining rotors. Roy W. Morse, Willow Grove, Pa., assignor to Autogiro Co. of America. (1,851,368)

Aircraft and watercraft construction. Axel Holmstrom, Monte Carlo, Monaco. (1,851,513)

Biplane parachute. Frank Loske, Brooklyn, N. Y. (1,851,712)

Airplane. Henry Hahn, Cedarhurst, N. Y. (1,851,764)

Automatic controls for airplanes. John V. Almeida, Newman, Calif. (1,851,797)

Airplane. Arthur Marney, Venice, Calif. (1,851,857)

Airplane. Thomas W. Reider, Pittsburgh, Pa. (1,851,867)

Propeller for flying machines. Edward Seppeler, Berlin-Neukolin, Germany. (1,851,874)

Air brakes for aircraft. Geoffrey T. R. Hill, Yeovil, England, assignor to Petter's Ltd. (1,851,907)

# LYCOMING MODEL R-680-BA ENGINE

**M**ADE by the Lycoming Manufacturing Co., the nine-cylinder Lycoming Model R-680-BA engine is designed for the consumption of 80-octane fuel. It weighs 505 pounds and has 240 horsepower at 2,000 r.p.m., according to Department of Commerce rating. With a bore of  $4\frac{5}{8}$  inches and a stroke of  $4\frac{1}{2}$  inches, it has a piston displacement of 680.4 cubic inches and a compression ratio of 6.5 to one.

The cast aluminum alloy cylinder head, with rocker arm supports cast integral, is screwed and shrunk on a machined carbon steel barrel. The head has a fin design arranged to provide maximum fin area over the entire head. The use of a spark plug enclosure cast integral with the head increases the fin area adjacent to the spark plug bushings and also provides for a clean radio shielding arrangement. An improved type spark plug bushing is used in this design.

The exhaust valves have hollow stems and are cooled with metallic sodium. They have tulip-shaped heads and are of chrome tungsten steel. The intake valves have a solid stem and are of

tungsten steel. The valves are spread  $30^\circ$  from the center line of the cylinder and face the air stream to procure adequate cooling of the valve seats. These are of aluminum bronze shrunk into the cast head.

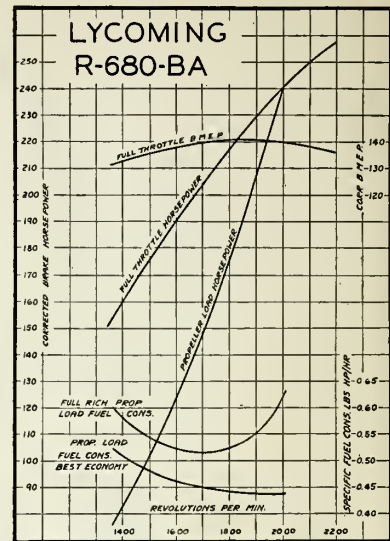
The cams, cam drive gears, cam followers, etc., are located in the forward part of the crankcase. The cams have four lobes each and run at one-eighth engine speed. Push rods, rocker bearings and rockers are totally enclosed, with the valve springs partially exposed in order to eliminate the corrosive effect of the exhaust gases on ball bearings and to promote valve cooling. The rockers carried on ball bearings are thoroughly seated against loss of grease. Two springs are used on the intake valve and three on the exhaust valve. All springs are made of round wire and helically wound in the same direction.

The crankshaft is of the two-piece, clamp type design. The shaft is counterweighted in carefully selected proportions, and the counterweights are forged integral with the shaft, which is hollow throughout the length. The shaft rides in three bearings, the ball thrust bearing and the two main ball bearings.

The connecting rods consist of one master rod and eight link rods. The master rod is of one-piece construction, machined from a chrome nickel steel forging and provided with a steel-backed high lead bronze alloy bearing. The link rods are of forged aluminum alloy pinned to the master rod with nitralloy link pins. Bushings in the link rod ends have been eliminated and the aluminum bears directly on the nitrided link pins.

Forged aluminum alloy pistons are used. The piston design incorporates a system of ribbing on the under side of the head to provide adequate cooling. Four rings are used above the piston pin and one below. The full floating piston pins are of nitralloy.

The crankcase assembly is built up of four components held together by studs and nuts: The thrust bearing housing, which contains the thrust bearing and cam followers' guides; the main bearing plate, which carries the front main bearing and cam drive assembly; the crankcase, which carries the rear main bearing and is provided with the cylinder pads; the rear accessories housing, which contains the drives for the magneto, distributors, oil pump, tachometer and generator or fuel pump. This last component also provides a mounting for the engine starter and carries the alignment bearing for the accessories drive shaft. These parts are made from heat-treated, cast aluminum alloy with the exception



Power and fuel consumption curves

of the main bearing plate, which is an aluminum alloy forging.

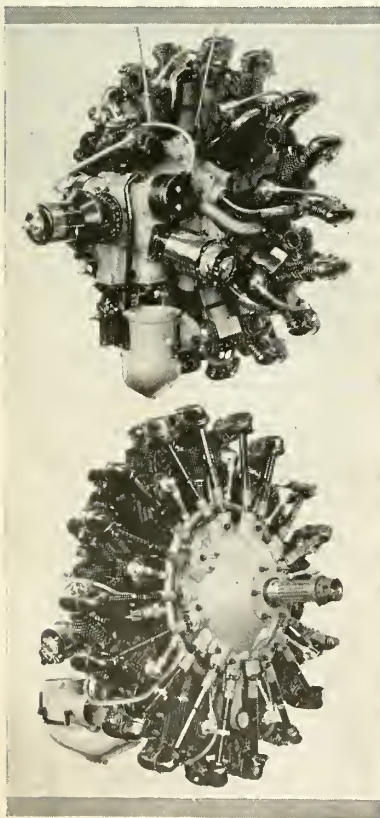
The oil sump is of cast aluminum alloy studded to the crankcase and thrust bearing plate. This sump also acts as a housing for the oil strainer. The accessories drive shaft is an alloy steel shaft, splined to the rear half of the crankshaft, and runs in a ball bearing carried in the rear accessories housing. This shaft carries the accessories drive gears and starter jaw.

Ignition is furnished by a Scintilla dual type SC-A vertical magneto with two independent distributors. Two entirely separate electrical currents are thus available, each firing one plug per cylinder. The whole ignition system is shielded for radio interference.

The Stromberg NA-R7-A carburetor is used. This unit is a single-barrel type equipped with a mechanical economizer and an accelerating pump.

A rotary induction system is employed, consisting of a cast aluminum impeller of large diameter driven at engine speed. The free flow areas throughout the induction system have been kept constant, resulting in a uniform distribution of gas at all speeds and providing good accelerating qualities. The mixture is carried from the impeller chamber to the cylinders through intake pipes radiating tangentially from the case. This design results in a complete breaking up of the mixture and an even distribution to each cylinder. An air intake design with ample areas is provided.

The lubrication system consists of one pressure pump and two scavenging pumps



Lycoming Model R-680-BA

built into one complete unit. The pressure pump supplies oil to the entire engine through drilled passages. The main pressure feed passes oil to the forward end of the crankshaft, where the oil enters the crankshaft through a grooved sleeve; a jet extends well into the oil passage in the crankshaft and lubricates the cam spider bearing and the cam drive gear. The oil then enters the crank pin and is distributed to the master rod bearing through two oil jets. The link pins also receive lubrication from this source through grooves machined in the master rod. A second pressure feed enters the cam idler gear pin through drilled passages. This lubricates the cam idler gears, and the oil is sprayed out on to the cam gear and cam followers. All oil from these two feeds drains into the oil sump at the bottom of the crankcase and is scavenged through a strainer screen by means of one of the scavenging pumps. The third pressure feed enters the distributor shaft through a drilled passage and is sprayed to all gear and bearings in the accessories housing. This oil is scavenged through a strainer by the second scavenging pump. The cylinder walls and piston pins are lubricated by

excess oil thrown from the crank pin.

The scavenging pumps discharge the hot oil into the passages around the induction system to eliminate condensation of the fuel in the walls of the impeller housing and of moisture in the rear end of the engine, also tending to cool the oil. In laying out the lubrication system, attention has been given to the complete elimination of piping. A complete tank circulating system is used. An oil pressure of 50 to 75 pounds is recommended for this engine. Oil pressure is controlled by a regulator.

The engine is provided with an S. A. E. standard starter drive operating directly on an extension of the crankshaft.

A tachometer drive pointing directly toward the rear and conforming to standard dimensions is incorporated in the design. This unit is easily accessible when the engine is installed in the plane, and the design is such that it can be withdrawn together with its gear for inspection. Two drives may be installed. A generator drive and S. A. E. standard mounting is incorporated in the engine design as optional equipment. The mounting and drive gear can be withdrawn as a unit for inspection.

## FLYING WING

The Flying Wing (L'ala Volante). *Rivista Aeronautica*, Vol. 8, No. 1, January, 1932, pp. 27-34, 4 figs.

THE results of some successful experiments performed in Germany on a new type of airplane without a tail are referred to and the superiority which this type of airplane presents in comparison with the normal types is discussed. The possibilities of constructing tailless airplanes for military uses are considered and the advantages which can be obtained with such an application, particularly with regard to velocity and offensive loads, are explained.

## AIRCRAFT VIBRATION

Aircraft Vibration, H. Constant. *Royal Aeronautical Society Journal*, Vol. 36, No. 255, March, 1932, pp. 205-239 and (discussion) 239-250, 27 figs.

STARTING with a study of the modes of vibration of a fuselage, the author shows how, for flexural vibrations, the fuselage may have several modes of vibration in each of its two planes of vibration. When any source of vibration synchronizes with the frequency of one of these modes, a resonant vibration is set up. In order to obtain some idea of the magnitude of the forces and couples that might be applied to aircraft without infringing some arbitrary limit of comfort, tests were carried out on the physiological effect of vibration of different frequencies, and limiting values for the magnitudes of most sources of vibration were defined, the limits depending on the frequency.

The actual sources of vibration existing in aircraft are then considered and their magnitudes compared with the limits already laid down. It was found that whereas the engine primary unbalance was insufficient to cause serious vibration, the engine secondary unbalance might do so when the specific unbalance was large. Of the harmonics of engine torque reaction, those of one-half order and first order were the only ones of importance. The chief source of propeller vibration was the effect of crosswind on the blades of the propeller. When on the turn or when climbing with large incidence, this source of vibration might become very serious.

## SAFETY IN SPINNING

Safety in Spinning, H. B. Irving and A. V. Stephens. *Royal Aeronautical Society Journal*, Vol. 36, No. 255, March, 1932, pp. 145-195 and (discussion) 195-204, 35 figs.

THE nature of the motion in a spin and the forces and moments set up are explained and the kind of moment likely to be most effective in putting a stop to the spin is described. Model work which has been done both in the wind tunnel and by free flight dropping tests is reviewed from the point of view of

(Continued on following page)

# DIGEST OF FOREIGN TECHNICAL ARTICLES

Elsa Gardner

## FRENCH AVIATION IN 1931

General Review of Aviation in 1931 (*Revue generale de l'aéronautique*), E. Chiron, editor. *Librairie Aéronautique*, Vol. 3, No. 13, 364 pp., many figures.

AFTER discussing the airplanes and seaplanes shown at aeronautical exhibitions from 1928 to 1931, R. Delbeug reviews the notable records made with airplanes in France and other countries. He describes the tendencies in aeronautical construction, especially French, and touches upon the exterior form, framework structure and special devices for improving the efficiency and safety of airplanes.

Under the heading of actual tendencies of commercial aviation in France, R. Rouanet relates the types of planes used by French airlines. He refers to laboratory research and aerodynamic characteristics of the profiles used, constructive tendencies, safety of material and performance and loads and describes the interior arrangement of the French transport planes.

Airplane engines at the Twelfth Aeronautical Exhibition is the subject discussed by Martinot-Lagarde with a spe-

cial description of the French engines and applications of the Diesel cycle.

New equipment and accessories used on French airplanes are discussed by R. Micoche, covering arrangements for the pilot's cockpit and cabins, individual equipment for protection and safety, instruments for automatic piloting and control and navigation equipment.

## CORROSION PREVENTION

Temporary Rust Preventers, E. C. J. Marsh and E. Mills. *Aircraft Engineering*, Vol. 4, No. 37, March, 1932, pp. 57-62, 10 figs., 5 tables.

SHORT-PERIOD protection of metals is discussed with special reference to grease and oils. The various processes employed in protection and the essential requirements of preventers are outlined while the merits of different classes of grease and oils are considered in detail. The results of tests made with 16 types of rust preventers are given. The humidity conditions and atmospheric conditions test results on iron and steel are shown as well as the humidity conditions test results on copper and brass. Lanoline products are recommended as yielding the best protection. A guide to the choice of best preventers concludes the article.

(Continued from preceding page)

recovery, and the effects of various modifications to the shape and arrangement of tail plane, fin and rudder and seaplane floats, as well as alterations in the moments of inertia, are pointed out.

The authors conclude that the effect of stagger depends on the moments of inertia of the airplane. The rudder is by far the most effective control for the purpose of recovery from an established spin. Ailerons are not likely to effect recovery by virtue of the rolling couple they can produce and their influence will be governed by the yawing moment they exert. Powerful elevators will probably effect recovery but the initial effect of setting elevators against the spin will always be a tendency to set up another and faster spin. Seaplane floats tend towards making the spin flatter and slower, their chief effect being on the pitching moment, producing a large positive moment and reducing the elevator control in the spin. Differential ailerons are of little use in a really flat spin, and floating ailerons may be expected to effect but little improvement in recovery. Spinning calculations, based chiefly on rolling balance tests of a complete model, rotated about the wind axis through the center of gravity, and a knowledge of the moments of inertia appear to give a fair approximation of the spinning characteristics of the airplane and a rough indication as to its quality of recovery.

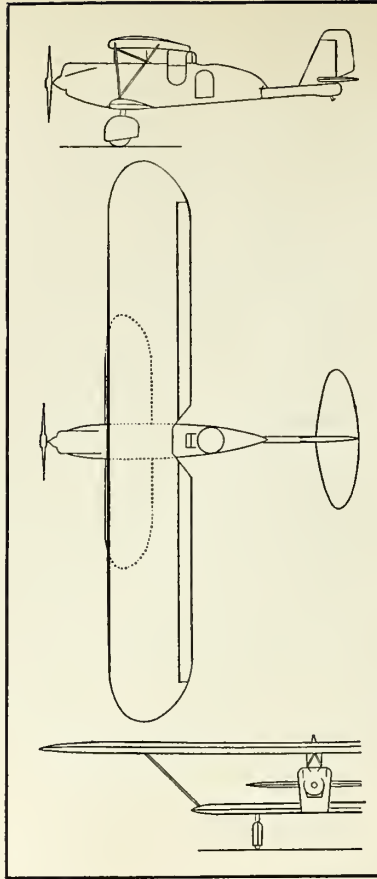
The authors recommend, as tending to prevent the development of the flat spin and the falling off in rudder power while spinning, raising the tailplane, sweeping back the tailplane or moving it aft of fin and rudder, positive dihedral angle on tailplane (bent upward) and deepening the body.

#### FRENCH PLANES AND ENGINES

Tables of French Aeronautical Products (Tableau Industriel L'aéronautique française). L'Aéronautique, Vol. 13, No. 151, December, 1931, pp. 406-438, 104 figs.

THIS is the fourth annual issue of L'Aéronautique to be devoted entirely to French aeronautical products and starts off by outlining the duties of the general technical director of the French Air Ministry and functions of the various government aeronautical departments. These include the Services des Recherches, Technique, Fabrications and Bases, as well as the Chambre syndicale des Industries aéronautiques.

The aircraft tables give specifications for seventeen primary and advanced training airplanes and seaplanes, thirty sport and touring airplanes, amphibions, seaplanes and autogiros, forty-nine transport airplanes and seaplanes, thirty-eight military pursuit, observation and multi-place day and night planes, twenty naval seaplanes and amphibions, five long-distance airplanes, three Zodiac airships and sixteen gliders. Specifications for



The French Breguet 33 sesquiplane

forty water-cooled and forty-two air-cooled engines are also covered. The equipment details and illustrations deal with French propellers, altimeters, carburetors, pumps, superchargers, navigation equipment, parachutes, photographic apparatus and landing gear.

A fifty-one-page section in the advertisement division of the magazine consists of a catalog of French aeronautical products, giving manufacturer's specifications for airplanes, engines and aeronautical equipment.

#### AIRCRAFT FUELS

Fuels for Aircraft Engines, F. R. Banks. Royal Aeronautical Society Journal, Vol. 36, No. 254, February, 1932, pp. 127-140, 4 figs.

THE relation of fuel to aircraft engine design and operation is discussed, and the theory as to the mechanical and chemical causes of detonation is explained. The author considers that the time has come to regard fuel as a material for the engine. He believes that once a specification has been settled upon it should be rigidly adhered to and that the engine should not be called upon to operate on a fuel inferior to the one selected. He states that the use of tetraethyl lead in

gasoline would obviate the necessity of depending entirely upon benzol and maintains that more uniform fuels from the point of view of knock rating could be universally obtained. He considers that much more can be done for fuel economy in the future by using compression ratios up to 7 to 1 and the employment of a supercharger for increased power.

The second section of the article is devoted to methods of testing and assessing the anti-knock values of fuels. The author believes that the power of an engine can be increased only by taking the fullest advantage of fuels having a high anti-knock value of, say, 80-87 octane, and designing the engine accordingly, employing high compression ratios and supercharging.

#### AUTOMATIC AIRPLANE CONTROL

Researches and Experiments on Automatic Control (Recherches et expériences sur le pilotage automatique), A. Étève. L'Aéronautique, Vol. 14, No. 152, January, 1932, pp. 11-15, 4 figs.

THE results of tests undertaken by the Service des Recherches de l'Aéronautique on a new form of automatic control for airplanes are discussed. The control, which is a combination of anemometer and wind vane, gave results in agreement with those anticipated in the calculations. The wind vane and anemometer and the combination of the two are described in detail. The object of the tests was to verify the principles of construction of the device, to ascertain its reliability when operating in a wind, to study the law of oscillations in the case of violent disturbances acting on the vanes and to measure the moments which correspond to the variations of speed and incidence.

#### WHEEL BRAKES

Brakes for Airplane Wheels (Freni alle ruote degli aeroplani), G. A. D. Cosci. Rivista Aeronautica, Vol. 8, No. 2, February, 1932, pp. 234-279, 32 figs.

BEFORE discussing the forces in play during the rolling of an airplane at landing, the author recommends a new type of tail wheel for airplanes. He then examines the forces in play and calculates the minimum length of rolling necessary. The expression for length of landing run he derives in functions of the weight of the airplane, its aerodynamic characteristics, its landing speed and the coefficient of friction of the wheels on the ground and determines how much maximum braking force must be applied to the wheel.

The practical example of the Caproni 101 trimotored Lynx airplane is given and the length of landing run for various assumed conditions is calculated. Various methods of brake control are explained and different types of brakes for airplane wheels are described, including



the Bendix brake, "Fast" mechanical brake, Vickers hydraulic brake, Palmer pneumatic brake and the "Aerofreno" brake which operates on compressed air and is designed only for airplane wheels.

*Note on Control by Flexible Wires or Cables. Method of the Three Arcs. (Note sur les commandes par fils ou cables souples. Methode des trois arcs), A. Etévé, L'Aéronautique, Vol. 14, No. 154, March, 1932, pp. 77-79, 3 figs.*

THE discussion of the combined anemometer and wind vane for the automatic control of airplanes is continued from the January issue of the magazine, this section dealing with the layout of wires leading to the vanes. This answers the question of how a changeable quadrilateral can be set up with two opposite sides rigid and articulated at their centers while the other two sides consist of wires in constant tension. A graphical solution called the three-arc method is given, showing that it is possible to obtain a control system without play of the movable parts around the axis of rotation by using wires or cables acting on levers.

## AERODYNAMICS

*Experiments on the Growth of Circulation about a Wing with a Description of an Apparatus for Measuring Fluid Motion, P. B. Walker. From Work Done in the Aeronautical Laboratory of the University of Cambridge Directed by E. M. Jones and W. S. Farren. (British) Aeronautical Research Committee—Reports and Memoranda No. 1402. (Ae. 523), January, 1931, 75 pp., 44 figs.*

APPARATUS consisting of a water tank through which models are towed and the behavior of the fluid photographed with the aid of oil particles in the water are described. It was intended for accurate quantitative investigation of the flow produced by wings and cylinders at moderately high Reynolds numbers and appears to be the most suitable means for investigating such flow before the motion has reached a steady state. Experiments were made with an R. A. F. 30 wing section and the results compared with calculations made with the aid of a mathematical theory published by Wagner for the early unsteady flow about a wing.

The photographs were analyzed with a measuring microscope designed for the purpose. It is concluded that Wagner's theory can be used to predict the unsteady flow about a symmetrical wing with a fair degree of accuracy.

## SPINNING

*The Effect of Centrifugal Force on the Controls in a Spin, S. B. Gates. (British) Aeronautical Research Committee—Reports and Memoranda No. 1416 (Ae. 537), May, 1931, 3 pp.*

DUE to the difficulty found in maintaining full rudder to recover from the spin of Aeroplane H, the influence which centrifugal forces have on the control moments was investigated. It was

estimated that in a spin of Aeroplane H, the force at the rudder bar necessary to balance the centrifugal moment on the fully-over rudder was 100 pounds, one-third of this being due to the tail skid which was connected to the rudder.

The centrifugal moments for Aeroplane H were at least twice as large as those in an ordinary spin, but the calculations indicated the necessity of seeing that no superfluous weights are attached to the rudder in spinning tests. They also showed the desirability of aiming at static balance in rudder design in order to make it as easy as possible to hold on full rudder for recovery from a spin.

## AIRPLANE MOMENTS OF INERTIA

*The Determination of the Moments of Inertia of Aeroplanes, S. B. Gates. (British) Aeronautical Research Committee—Reports and Memoranda No. 1415 (Ae. 536), March, 1931, 8 pp., 7 figs.*

IMPORTANCE of air forces due to acceleration in influencing the period of an airplane when swung as a compound pendulum in air is discussed. The periods of a Bristol Fighter when swung in air by a cable suspension were measured, and an auxiliary experiment was made on a light model to determine the virtual moments of inertia. These results were compared with values estimated from the weight schedules.

It is concluded that a moment of inertia determination by swinging is worthless without a subsidiary test. The overall accuracy of a swinging test, corrected for virtual moments, was about five per cent. It was found that the complication involved in an accurate measurement of moments of inertia was such that reliance must be placed in general on calculation, of which the order of accuracy appears to be about 10 per cent.

## SEAPLANE TAKE-OFF

*Theoretical Investigation of the Take-Off Time of "Singapore II," W. G. A. Perring. (British) Aeronautical Research Committee—Reports and Memoranda No. 1412. (Ae. 533), February, 1931, 10 pp., 4 figs.*

AS tank tests on models of the "Singapore II" indicated that the running attitude during taking off may have an important influence on the take-off time, the present investigation was undertaken to determine the effects theoretically. The calculated and observed take-off times were in fairly good agreement, and the calculations showed that it should be possible to reduce the take-off time by about 1½ seconds if the attitude throughout the run is maintained at an angle of minimum resistance. The take-off time can be reduced by a further two seconds if, in addition to taking off at the angle of minimum water resistance, the "Singapore II" can be flown at its minimum flying speed. Overload calculations showed that it should be possible to take off in no wind at an all-up weight of 32,600 pounds.

*The Effect of Various Types of Lateral Stabilizers on the Take-Off of a Flying Boat, L. P. Coombes and R. H. Read. (British) Aeronautical Research Committee—Reports and Memoranda No. 1411. (Ae. 532), October, 1930, 5 pp., 6 figs.*

INFLUENCE of different types of lateral stabilizers on the take-off of the Short "Singapore I" flying boat is calculated. The data on which the calculations were based were deduced partly from model results and partly from full-scale tests. Calculations were made for the time to take off over a range of weights, and the suitability of throttled take-off tests for predicting the limiting weight at which a seaplane can take off was investigated.

It was found that the loss of efficiency due to fitting either inboard floats or stubs in lieu of wing-tip floats was very great, amounting to a reduction in service load of nine per cent and 17 per cent, respectively, for a take-off of 60 seconds under calm conditions. Throttled take-offs at normal loads may give rise to errors of the order of two per cent if used for predicting the maximum weight at which a seaplane can be taken off in a reasonable time.

## CAUSES OF ACCIDENTS

*Accidents in Civil Aviation, A. G. Lamplugh. Royal Aeronautical Society Journal, Vol. 35, No. 254, February, 1932, pp. 93-102 and (Discussion) pp. 102-110.*

CAUSES of airplane accidents are discussed with comparative percentages and statistics from America, France and Germany, as well as Great Britain. The author points out the fact that in 1926 the error of judgment factor for both professional and amateur pilots was approximately 35 per cent, while in 1930 the percentage for professionals dropped to 17.06 and for the amateurs to 33.65 per cent. In regard to the percentage of mortality among pilots, he mentions that the danger period, so far as age was concerned, appeared to be somewhere in the early twenties. He outlines the procedure for investigating accidents which is followed in America, France and Germany and compares it with British methods.

The possible remedies to lower the number of airplane accidents which are suggested by the author include: Improvement in the standard of training for all classes, with a general increase in the standards of airmanship and navigation; care in selecting and licensing of instructors; air traffic control at airports and along traffic routes; development of oil fuel and compression-ignition engines; control at low speeds and other safety devices in the form of blind flying equipment, slots and parachutes; design of airplanes with improved visibility; overhaul and revision of international regulations for air navigation.

(Continued on page 67)



## STINSON MODEL U TRIMOTOR

**F**OUR years of development work plus two years' operation experience are incorporated in the new Stinson Model U, powered with three 240-horsepower Lycoming engines. With the introduction of its new ten-passenger trimotored airliner, exhibited for the first time at the Detroit Aircraft Show, the Stinson Aircraft Corp. makes its strongest bid in the medium sized multi-motored field. To break down the operators' resistance to the purchase of new airline equipment, the design problem involved exceeding the economical features of previous Stinson trimotors while at the same time providing the operator with a better plane of greater profit possibilities.

How the Model U has met these problems is best described by comparison with its Model T predecessors, which have flown more than 8,000,000 miles in airline service during the past two years.

The price has been reduced.

Horsepower has been increased from 645 to 720. Three new 240-horsepower Lycoming radial transport engines are used instead of the previous 215-horsepower Lycomings.

Cruising speed has been increased from

110 to 123 miles per hour.

Gross loads have been increased from 8600 to 9300 pounds without increasing wing or horsepower loading.

Service ceiling, fully loaded, has been increased from 12,500 to 14,500 feet.

Altitude is maintained, fully loaded, on two engines, at 7,000 feet instead of 6,000 feet.

Standard gasoline capacity has been increased from 120 to 140 gallons, giving an increased cruising range of 100 miles.

Baggage capacity has been enlarged from 147 to 250 pounds.

Cabin noise has been materially decreased, due to additional soundproofing plus the fact that all propeller overlap has been eliminated.

Cabins have been widened seven inches, which makes possible wider chairs, deeply tufted with arm rests on both sides, and wider aisles. Additional head room has also been provided, thus permitting the installation of hat and coat racks.

More leg room is provided by carrying all baggage in the lower stub wing, which has the further advantage of placing this load directly over the center of gravity.

A large dressing room with complete lavatory facilities is now provided in the

rear of the cabin, utilizing space formerly reserved for carrying baggage.

A ventilating system has been provided which changes the air in the cabin every four minutes, and heating has been provided by taking heat from three engines instead of from only the center engine, as was formerly the case.

Individual reading lights have been provided for each passenger and are shaded so that occupants of other seats are not disturbed.

Passenger vision has been improved by eliminating certain struts and by lowering the outboard engines, which enables the passenger to look directly over the top of the engine.

Ply-metal, with sound-deadening balsam wool sandwiched between, is used on the cabin walls, and the interior finish conforms to the latest color designs in marine and pullman practice. Cork linoleum is now used on the floors, and all corners have been rounded for ease in cleaning.

Full airwheels are used instead of high pressure tires.

Engines are mounted directly on the lower stub wings, thus securing a lower center of gravity and increased inherent



Passengers' cabin of the latest Stinson Model U Trimotor showing the improved seating arrangement for ten passengers

stability as well as improved appearance.

The pilot's compartment, redesigned by pilots, has a Vee-type windshield with sliding windows which give unobstructed forward view in bad weather, at the same time protecting the pilot from a rush of air or rain. The instrument panel is indirectly lighted and is designed in connection with the windshield to eliminate reflections at night. All instruments, including outboard engine instruments, are installed in the pilot's compartment. Adjustable stabilizer, adjustable fin, flare releases, landing lights, radio, pressure fire extinguisher controls and gasoline shut-off valves are all placed within easy reach of the pilot.

The pilot's seat is wider, deeper and adjustable, and provision is made for dual controls if desired. Stinson-type wheel brakes operating in conjunction with the rudder are used, and a parking brake is also provided. Ball bearing pulleys are used in connection with all controls, and the plane is so stable that it may be flown with hands and feet off the controls.

The Model U differs from previous Stinson in that a stub wing is provided at the base of the fuselage to carry the outboard engines and to augment the lifting power of the main wing. This stub wing, which is built bridge-fashion of heavy, trussed, heat-treated chrome-molybdenum spars, also provides a base for the landing gear, makes possible an unusually wide tread and streamlines the design by eliminating many unsightly, resistance-producing struts.

Chrome-molybdenum steel tubing of Air Corps specifications is used in the fuselage and landing gear, while the wings are of heat-treated chrome-molybdenum steel spars of the truss type with duraluminum ribs and leading edge.

As in the former Stinson airliner, all parts in the new plane are standard and interchangeable, since they are built in carefully aligned jigs and dies.

**Specifications**

Wing span .....	66 feet
Wing area .....	574 square feet
Wing chord .....	8 feet 9 inches
Length .....	43 feet 2 inches
Height .....	11 feet 6 inches
Weight, empty .....	6230 pounds
Weight, loaded .....	9300 pounds
Pay load .....	3070 pounds
Cruising speed .....	123 miles per hour
High speed .....	141 miles per hour
Landing speed .....	60 miles per hour
Climb at sea level....	1,000 feet per minute
Service ceiling with maximum load .....	14,500 feet
Gasoline capacity .....	140 gallons
Oil capacity .....	15 gallons
Cruising range .....	350 miles
Hourly fuel consumption, cruising speed .....	39 gallons
Hourly oil consumption, cruising speed .....	3 quarts

**DIGEST OF TECHNICAL ARTICLES**

(Continued from page 65)

**FLYING-WING TRANSPORT PLANE**

**Investigation of the Financial Advantages Obtainable by Employing the Flying Wing as a Commercial Airplane** (Studio sui vantaggi economici conseguibili con l'impiego dell'aeroplano commerciale tutt'ala), M. Gasperi. *L'Aerrotecnica*, Vol. 12, No. 1, January, 1932, pp. 14-33, 11 figs.

**A**DVANTAGES of the flying wing in regard to aerodynamical efficiency and lightness of structure are pointed out by the author in discussing the possibility of reducing costs in air transport by employing the flying wing as a transport plane in which the passengers are accommodated inside the wing and the tail planes are carried by tail booms. A three-engined flying-wing model designed by the author is described which showed a maximum efficiency of 15 and a minimum drag factor of 0.015 in the wind tunnel. The full-sized aircraft has a span of 45 meters, a lifting surface of 343.19 square meters and accommodations for 40 passengers in rooms in the wings.

Since a wing of very great volume is required, the flying-wing type of airplane has a limit in size for which it is suitable. According to the author's calculations, its minimum total weight must exceed eight tons.

Equations are determined connecting the fuel consumption, the weight empty without an engine and the useful load of an airplane. From these equations and from the statistical data relating to the operation of three Italian airlines, the author concludes that, by substituting the flying wing with an efficiency of five for the present airplane having an efficiency of nearly eight, a saving of from 25.5 to 42 per cent could be obtained, according to the length of flight.

The author finally shows that the flying-wing transport plane allows both an increase of 20 per cent in velocity and a gain of 35 per cent in pay load without raising the horsepower per square meter of lifting surface. The range may be further increased by 160 per cent in comparison with that of present commercial planes.

**HEAVY-OIL TWO-CYCLE DOUBLE-ACTING ENGINE**

**A New Engine with Small Bore for Automobiles and Airplanes—Heavy-Oil, Two-Cycle, Double-Acting** (Nuovo motore di piccolo alesaggio per autovivoli e velivoli—ad olio pesante, a due tempi e doppio effetto), M. Behmann. *Rivista Aeronautica*, Vol. 8, No. 1, January, 1932, pp. 62-67, 9 figs.

**C**OMPLETE details of a new 35-horsepower two-cycle double-acting heavy-oil engine for airplanes are given by the inventor. Descriptions of a similar engine appeared in the November, 1930, and February, 1931, issues of the magazine and were abstracted in the February and May, 1931, issues of **AERO DIGEST**. In the current issue under re-

view, the author describes an engine of lower horsepower and a smaller bore which he claims effects a saving in weight. Detail and assembly drawings show the crankcase, cylinder block, crankshaft, connecting rods, cylinders and heads, pistons, cooling, lubrication and injection system. Dimensions are included.

The double-acting effect is secured with a hollow piston containing the second cylinder and a second stationary piston, the second cylinder moving with motion of the first piston. The design has six cylinders of very small bore, that of the external cylinder being 2.16 inches, and of the internal cylinder, 1.96 inches. The stroke is 2.12 inches and the compression ratio one to 12. The engine develops 35 horsepower at 2,000 r.p.m. and weighs 119 pounds, or 3.4 pounds per horsepower.

**TWIN WASP JUNIOR ENGINE**

(Continued from page 68)

The distinctive feature of this gear is the means for equalizing the load on six pinions. It is a concentric gear of compact design and the application of it adds approximately 80 pounds to the weight of the direct-drive.

Because of special features of design and light weight of the reciprocating parts it is possible to operate safely at higher r.p.m. than other radial engines of similar displacement. This makes possible higher ratings for the geared engines than for those of the direct-drive. Supercharging can be increased over that now used, where the class of service may warrant. The center of gravity of the engine is much closer to the engine mount than would be expected on an engine of this type. The small overall diameter of 43½ inches permits good vision in single engine tractor installations.

Both geared and direct-drive engines of the Model R-1535 have been block tested and both have been flown for a considerable number of hours. Engines for experimental service tests are being delivered to the Navy Department. Coincidental with the development of the R-1535, other Pratt & Whitney models of the two-row radial type are being developed and tested.

**Specifications**

Bore .....	5.1875 inches
Stroke .....	5.1875 inches
Displacement .....	1535 cubic inches
Compression ratio .....	6 to 1
Blower ratio .....	10 to 1
Rated power at 2100 r.p.m. ....	625 h.p.
Weight, bare .....	830 pounds
Weight per horsepower ....	1.33 pounds
Length overall .....	48.250 inches
Diameter overall .....	43.875 inches

# Model R-1535 Pratt & Whitney "Twin Wasp Junior" Engine

A. V. D. Willgoos

Chief Engineer, Pratt & Whitney Aircraft Co.

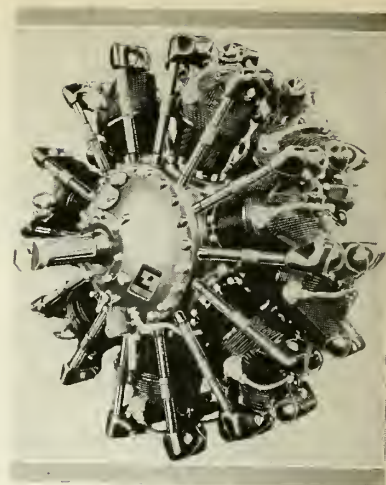
THE recently announced 14-cylinder, two-row, air-cooled, radial engine known as the *Twin Wasp Junior*, designed and manufactured for the U. S. Navy by the Pratt & Whitney Aircraft Co., marks the first departure of the company from the fundamental design of the single-row *Wasp*. The *Twin Wasp Junior*, technically designated as Model R-1535, was conceived with the idea of decreasing head resistance for high-speed aircraft and to improve vision over that possible with a single row of cylinders for an engine of the same displacement. The general specifications for the engine were made by the Naval Bureau of Aeronautics.

A brief description and illustration of this engine appeared in the April issue of *AERO DIGEST*; additional details are now available, as follows:

The engine has two banks of seven cylinders each, individual banks resembling closely and incorporating the general features of the single-row models. Cylinder design follows standard Pratt & Whitney practice of using cast cylinder heads screwed onto finned steel cylinder barrels. The cylinders have integrally cast rocker boxes and a special arrangement of closely spaced cooling fins, as first introduced on the standard single-row engines. The main crankcase is built in three sections, designed to be forged, but the first engines have heat-treated cast

cases; these will be forged in production. The center section represents half of the main case for front and rear banks, while the front and rear main sections are alike and complete the main case assembly. These sections are bolted together. The front and rear main case sections carry the cams and tappets from which push rods extend to the valve rockers for front and rear banks of cylinders, respectively. The front crankcase section, which carries the thrust bearing, the support for the front end of the crankshaft, is fastened to the tappet extension of the front main case on both geared and direct-drive engines. This section is fitted with a built-in valve for the operation of the Hamilton Standard hydro-controllable-pitch propeller, which makes possible improved take-off and climb. It is also provided with separate scavenging means for the return of oil to the tank during a steep dive. The rear of the engine consists of a blower section and rear of design similar to those used on all Pratt & Whitney engines.

The crankshaft is constructed of one forged piece, having the crank throws set at 180 degrees to each other and supported on four bearings. The master connecting rods are of special two-piece construction and carry steel-back, bronzed bearing shells which operate on hardened crank pins. The articulated rods have bronze bushings for attachment



to knuckle pins and piston pins. Master and knuckle pin bearings are pressure lubricated in the usual manner.

Pistons are of forged aluminum alloy of special Pratt & Whitney design, each having three compression rings and one scraper. Valves are mounted in bronze guides and seated on forged aluminum bronze seats. The exhaust valves are internally cooled with sodium.

A triple oil pump assembly is mounted on the rear section, comprised of two scavenging pumps and one pressure pump. The oil supply for the main bearings is introduced into the front end of the crankshaft. One scavenging pump empties the sump and the other the front crankcase section.

The propeller hub is of the No. 30 S.A.E. spline size for direct-drive engines and No. 40 for the geared engines.

Eight mounting lugs are cast on the blower section and are arranged in four pairs to meet the mounting ring at points of attachment where the Vee braces in the conventional engine mount usually converge.

The accessory section is similar to those of *Wasp* and *Hornet* models and carries two Scintilla 14-cylinder shielded magnetos, the oil pumps, fuel pump, Stromberg carburetor, Pratt & Whitney combination hot spot and oil temperature regulator, provision for driving two gun synchronizers, two tachometers and generator. The oil strainer and oil pressure relief valve are also mounted on the accessory section, while provision is made for oil temperature thermometer connections. A standard mounting flange is provided for the attachment of various types of starters.

The supercharger drive is similar to that used on the latest Pratt & Whitney *Wasp* and *Hornet* highly supercharged engines but has increased clutch capacity.

In the geared engines, a patented three-to-two planetary reduction gear is used.

(Continued on page 67)



Vought "Corsair" powered with the new "Twin Wasp Junior" engine

# NEW EQUIPMENT AND METHODS

## Ball Bearing Cartridge

THE Fafnir ball bearing cartridge, especially suited for application to airplane surface hinges, is manufactured by The Fafnir Bearing Co. of New Britain, Connecticut. The assembly consists of a cartridge bracket, into which the ball bearing unit is pressed, and a pin bracket which carries the bolt. The bracket design, to be made by the plane manufacturer, depends on the design of the surfaces, but the mounting can be adapted to practically every type of leading and trailing edge, including wood, tubular and channel constructions in various dimensions.

Made with a felt seal, designed to exclude dirt and water and retain the lubricant, the device has the smallest dimensions possible for a quarter-inch bolt and such a seal. The cartridge is easy to assemble, since no fitting of bearing surfaces is necessary, and units can be taken up tight without binding, resulting in a permanently lubricated, frictionless hinge, requiring no servicing nor replacement. The ball bearings, which are designed to compensate for about two degrees of misalignment, tend to reduce flutter resulting from wear in plain bearings. The wide inner ring of the bearing makes spacing washers unnecessary.

## Valve Guide Remover

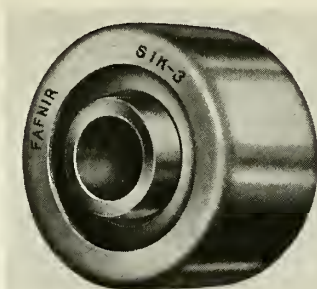
A TOOL to remove valve guides from Lambert, Kinner and Warner cylinder heads without heat and hammering has been announced by Air Transport Equipment, Inc., of Garden City, N. Y. The device is constructed of steel and is equipped with thrust ball bearing.

## Safety Vest

THE Hodgman Sel-Flate Safety Vest has been designed by the Hodgman Rubber Co. of Malden, Mass., to make over-water flying safer. The device is worn in the same way as an ordinary vest. It lies flat to the body, acting as a wind-breaker, is not bulky and gives freedom of action. When protection is needed, a quick tug on two trigger strings at the bottom of the vest "fires" two small cartridges containing carbon dioxide, causing the inflation. The design of the vest's collar keeps the wearer's head well out of water, even though he should become unconscious. There is sufficient buoyancy in the device to support two persons afloat.

## B Battery Eliminator

THE Pines Winterfront Co. produces the Pines B battery eliminator for airplane radios. It is of simple and rugged construction and designed so that oiling, greasing and adjusting are unnecessary.



Fafnir ball bearing cartridge

The eliminator consists of a "triple-tested" motor in connection with a rotary transformer. It takes the current from the A battery, steps it up, rectifies and filters it, delivering to the set a constant, smooth direct current which produces a clear tone. Snow, water or slush do not affect its efficiency, and temperatures of from 35° below zero to 150° above failed to impair its performance. The results this eliminator made possible were comparable in tone, distance and selectivity to those of home radios operated by electric power. Tests also showed that the battery drain is less than the amount of current necessary to operate a single automobile headlight.

The installation requires a space of 5¾ inches by eight inches and is 6¼ inches deep, approximately one-third the space required for the B battery which



Sel-Flate Safety Vest inflated

the eliminator replaces. Its total weight is only 15 pounds, including a metal container which protects it from damage.

## Glass Navigation Lights

A NEW TYPE of navigation light to meet present Department of Commerce regulations has been announced by Air Associates, Inc., of Garden City, N. Y., and Chicago, Ill. Made entirely of metal and glass, the light is weatherproof and non-inflammable. It weighs eight ounces. The light cannot easily be crushed or broken and is of a neat, streamline shape, with a polished aluminum shell. It can be installed readily in any position, having a rotatable lens, and is furnished for either six-volt or 12-volt circuits. Burned-out bulbs may be replaced quickly without the necessity of unscrewing any part.

## Aircraft Fuel Pump

THE Evans Appliance Co., Detroit, Mich., manufactures the Evans aircraft fuel pump, which has an eccentric vane and is made of an aluminum die casting with an aluminum cover. The body has a cast iron insert with the running parts of nitralloy nitrided steel. The pump has only three moving parts—the shaft, rotor and vanes. In the cover is a bypass relief valve feature that keeps a constant pressure at all times and feeds fuel to the engine in direct proportion to its consumption, eliminating fire hazards and giving a positive lubricant to the shaft. The pump will prime the cylinder at about 50 to 100 r.p.m. The wet and dry lifts at 200 and 1500 r.p.m. are 7 to 16 feet and 15 to 22 feet, respectively.

Weighing approximately 1¾ pounds, the pump has an overall length and width of 3¾ inches. The device is designed so that its efficiency will increase with use. Among the features of the pump is a patented oil seal that eliminates the possibility of crankcase dilution and permits the pump to run dry indefinitely.

## Enamel For Engines

BLACK ENAMEL for air-cooled engines has been developed, particularly for cylinders and cylinder heads, by Berry Brothers of Detroit, Mich. It is best applied by the spray method, reduced 10% to 15% with naphtha, but may be brushed on easily at full body, as well as dipped, reduced 25% with turpentine. If applied over old paint, the surface should be washed off well with high test gasoline or a good cleaning solution, using a wire brush to remove loose or flaking enamel. Immediately after blowing off any dust or dirt particles with an air jet, the enamel should be applied at once. It is better to remove old paint with air-

plane caustic solution and to sandblast the outside surface just before applying the new enamel.

If the enamel is to be air dried, it should be allowed to stand at least overnight between coats. Later the heat of the engine will bake the surface harder. It may be baked on in two hours at 220° F. or 1½ hours at 300° F.

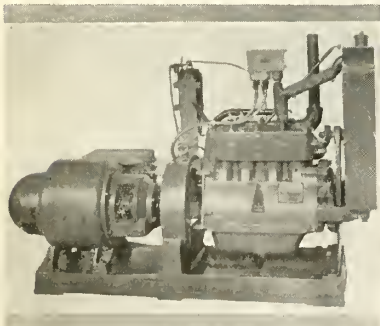
A similar gray enamel is available for use on engine accessories and crankcases. It air dries rapidly and withstands oil, gasoline, heat and moisture to an unusual degree. It may be brushed at full body but should be reduced from 20% to 25% with naphtha for spraying.

#### Gas-Electric Power Unit

INITIAL DELIVERIES have been made on the Department of Commerce order for 85 Pyle-National Type AG gas-electric generating sets, to be installed at airway beacon sites throughout the country. These sets are a type especially developed to meet the Department of Commerce requirements for power at the beacons, many of which are at isolated locations.

The Pyle-National type AG power unit has a capacity of three KVA and delivers 110-volt, 60-cycle current. It consists of a special type H2 direct-drive Continental four-cylinder engine connected to a Pyle-National generator. The set operates at 1200 r.p.m. The generator is self-excited, and provision is made for battery charging and for operation as a motor when starting the set. Typical Pyle-National close voltage regulation is provided, and the set has demonstrated a remarkably low fuel consumption.

The set is arranged for full automatic operation, being started and stopped in the regular cycle of operation every day by means of automatic control devices. In case of failure of the control apparatus, the set can be operated by means of a manually operated switch provided for that purpose. A feature of the operation is that this set automatically starts whenever the cooling water temperature reaches the minimum of 50° F. The set



Pyle-National type AG power unit

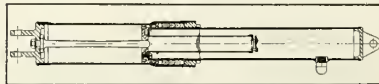
will operate long enough to warm the cooling water to 120° F. and will shut off and stand until the temperature falls again to 50° F.

At the beacon sites where the Type AG gas-electric units are being installed they carry the full night lighting load of the standard Department of Commerce beacons. The controlling apparatus starts the set and connects it to the load within a predetermined period. The time between the actual starting of the engine and connection of the load provides an ample period within which the engine is heated sufficiently to carry the load.

Normally installed in duplicate, the sets are arranged for full automatic operation, each set operating on alternate nights. A few of the 85 type AG sets on this order may be installed as single units for standby purposes where central station power is used. Where such power is taken from a high tension line, these auxiliaries are arranged to operate automatically in case of failure of the high tension line current. At beacon sites where sets are installed in duplicate, provision is made in the wiring arrangement whereby one set acts as a standby for the unit which is operating. The sets will operate under entirely automatic control for periods of 30 days or more. One of the sets has completed an 18 months' test at a Department of Commerce airway site on the Chicago-St. Louis airway with a satisfactory operating record.

#### Pneudraulic Shock Strut

THE Bendix Pneudraulic Strut, manufactured by the Bendix Aviation Corp., South Bend, Ind., is a combined pneu-



Section through pneudraulic strut

matic and hydraulic type strut including a rebound snubbing device. Impact loads are absorbed by the flow of oil through an orifice which varies at different points in the stroke and by the compression of the air above the oil as the oil level rises. Taxying loads are absorbed largely by the compression of the air, as the velocity of the oil through the orifice is not sufficiently great to absorb much energy. Rebounds are reduced by a snubbing device so set that the natural period of rebound of the tire may be almost instantly damped out by another period of rebound of the strut controlled by the snubber.

The use of air for absorption of taxying loads permits reduction of weight by eliminating the heavy spring used with spring hydraulic type struts. The use of a hydraulic unit designed to give a nearly uniform resistance throughout its entire stroke permits a shorter stroke and a smaller diameter than required by a pneu-



Rusco safety belt buckle release

matic type strut absorbing the same amount of impact energy. Upon the plane's taking off, the strut is completely extended by the air pressure in the strut, which is sufficient to seal the packing against leakage. Upon landing the oil is forced through the orifice by the downward movement of the piston into the upper chamber, compressing the air above the oil but passing freely through the flap valve on the top of the snubber tube mounted above the orifice. As soon as the stroke is completed, the compressed air tends to force the oil back, which closes the flap valve and allows the oil to be metered slowly out through the small holes at the bottom of the tube, thereby controlling rebound. The size of these holes may be varied to suit the rebound characteristic desired.

#### Rusco Safety Belt

A NEW SAFETY BELT, making use of the recently invented Rusco-Dowd buckle, devised by R. E. Dowd, aeronautical engineer of the company, has been announced by the Russell Manufacturing Co. of Middletown, Conn., makers of Rusco brake linings and other automotive and aviation products. This company pioneered the three-inch all-web belt, later the two-inch belt for transport use, the snap-lock release lever and the decorative applique. Due to the light weight of the Rusco-Dowd buckle and because the webbing is used in single thickness, the complete assembly is about 40% lighter than present standard belts. It is a two-inch belt capable of taking a 2,000-pound load applied as a passenger's weight and is, therefore, satisfactory for a side-by-side seating arrangement in which a single belt is used.

In use, the buckle is first closed and the web threaded through in the same manner as with a standard luggage strap. It is drawn up to the required size and the free end tucked into the buckle. The adjustment can easily be altered while it is made up, without endangering the safety of the wearer. A simple lifting of the release lever parts the buckle so that the wearer is free instantly. For special installations, a retractable arrangement which draws the belt under the seat has been developed. Tests have been completed under the Department of Commerce requirements.

# AERONAUTICAL INDUSTRY

## *Bendix Awards Flying Trophies*

**F**ORMAL award of the famous Bendix trophies by Vincent Bendix, president of Bendix Aviation Corp., to the winning contestants in the 1931 Transcontinental Speed Dash was a feature of the Society of Automotive Engineers banquet April 7 at Detroit, Mich., during the National Aircraft Show. Major James H. Doolittle, as winner of first place, received a gold replica of the trophy; Harold S. Johnson, who was second, was awarded a similar silver trophy, and Beeler Blevins, who placed third, a bronze one.

The Transcontinental Speed Dash was one of the principal events of the National Air Races at Cleveland last year. Major Doolittle won the race by an eleven-hour, sixteen-minute flight last September between Burbank, Calif., and Newark, N. J., when in his Laird *Super-Solution* biplane racer he maintained an average speed of 223.038 miles per hour for a distance of 2,882 miles, lowering the transcontinental record of twelve hours and twenty-five minutes made by Capt. Frank Hawks. Although the race ended officially at Cleveland, Major Doolittle continued to Newark, winning a special award posted by Mr. Bendix to induce Bendix Trophy fliers to attempt the breaking of the transcontinental

record in addition to gaining first place in the race.

Starting his flight from United Airport, Burbank, at 8:35 a. m., Eastern Time, September 4, 1931, Major Doolittle landed three times for refueling at Albuquerque, N. M.; Kansas City and Cleveland. After reaching Newark, he returned to Cleveland in a little more than an hour.



The Bendix Trophy

Winners of second and third places in the race, flying Lockheeds, made average speeds of 199.816 and 188.992 miles per hour, respectively. They also shared proportionately in the prize money, which had been increased by Mr. Bendix from \$10,000 to \$15,000.

The Bendix Trophy has been donated on a five-year basis, beginning in 1931, arranged in accordance with the five-year program of National Air Races. Two figures symbolical of speed, above which an airplane is winging its way over the earth, are the central motif of the trophy. In establishing the trophy, Mr. Bendix said that his object is to encourage high speed transcontinental flights. He believes that such races contribute tremendously to high speed cross-country flight development, a logical course in the progress of air transportation.

## *Fechet to Speak in New York*

PROGRESS of aviation in the United States will be discussed by Maj. Gen. James E. Fechet, former Chief of the Army Air Corps and present National Defense Editor of *AERO DIGEST*, at the May aeronautical meeting of the Society of Automotive Engineers. The meeting will be held at 7:30 following a dinner on the evening of May 19 at the A. W. A. Clubhouse, 357 West 57th Street, New York.



Presentation of Bendix Trophies to 1931 winners. Left to right: Vincent Bendix, donor; Cliff Henderson, manager of the National Air Races; Harold S. Johnson, second place winner; Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics; Maj. James H. Doolittle, first place winner; Beeler Blevins, third

City. Arthur Underwood is director of aeronautics for the society.

### *Sportsmen Pilots to Race*

THE third annual Sportsmen Pilots' Race of the Aero Club of Pennsylvania will be flown on Sunday, May 29, with the start and finish of the race at Patco Flying Field, located twelve miles northwest of Philadelphia, Pennsylvania. The principal prizes include the Hollinshead N. Taylor Memorial Trophy and other awards given by the club.

Since the event is a handicap race, handicaps are determined by tests of speed by a test pilot designated by the Aero Club. This year the test flights will be made by J. Wesley Smith, veteran racing pilot of the club, who will fly the ships over a three-mile test course.

The race itself will be over a triangular course of more than 100 miles. The route of the course will not be announced to the pilots until one hour before starting time, during which period all planes will be prohibited from leaving the ground.

In 1930 ten seconds separated the winner, H. A. Little, Jr., from the second plane to finish, piloted by Ray Kruezer of Trenton, New Jersey. In 1931 only eighteen seconds separated the winner, L. P. Sharples, from Larry Moore, who finished in second place, while Charles Lane, flying the third ship to finish, was twenty-three seconds behind Moore's ship.

The contest is conducted with the consent of officials of the Department of Commerce and the Pennsylvania State Aeronautics Commission. Entries are not restricted to members of the club, and any one who owns his plane and has never flown for pay except in air meets may apply for an invitation to compete by writing the Aero Club of Pennsylvania, 1339 Walnut Street, Philadelphia, Pennsylvania.

### *Birmingham Air Show*

A TWO-DAY air carnival, to be held June 4 and 5, is being planned at Birmingham, Ala., under the sponsorship of the Birmingham Aero Club. The carnival will mark the first anniversary of the dedication of the million-dollar municipal airport at Birmingham. Asa Rountree, Jr., has been appointed as chairman in charge of the arrangements.

### *Four-Day Air Events at Omaha*

EIGHTEEN heavier-than-air contests have been announced as joint features with the National Balloon Race at the second annual Omaha Air Races May 27-30. All the events, some of which have been limited to men contestants in the past, are open this year to women.

The "Speed" Holman Trophy will be awarded to the winner of an aerobatics competition to which entries will be by invitation only. Other trophies will go to the winners of three sportsmen pilots' races.

Cash prizes amounting to \$10,000 will be divided among the first five place-winners in each of the other events. The largest award for one contest, \$1,000, will be for a free-for-all race for any displacement. Among daily competitions will be dead-stick landing contests and novelty races. Army fliers will give exhibitions of aerial maneuvers.

The Litchfield Trophy will be awarded

to the National Balloon Race victor, who with the winner of second place will be placed on the United States team in the Gordon Bennett Trophy race at Basel, Switzerland, next September.

A non-competitive feature of the program will be the dedication of a \$100,000 administration building at the airport. Stands seating 15,000 spectators are under erection.

Manager Phil Henderson, who is directing the arrangements, will be assisted by W. E. Cleveland and Ray Brown. The races will be held under the auspices of the Omaha Junior Chamber of Commerce.

## COMING AERONAUTICAL EVENTS

May 7-28. International Olympic Air Cruise, beginning and ending at Los Angeles, Calif., planned to visit thirty-three cities in the United States, Mexico and Canada in the interests of the Tenth Olympiad; under the auspices of the Los Angeles Junior Chamber of Commerce.

May 16-22. Northwest Aircraft Show, St. Paul, Minnesota.

May 19. May Aeronautical Meeting of the Society of Automotive Engineers, New York City.

May 20. Fifth Anniversary of the start of the Lindbergh flight from Roosevelt Field, Long Island, N. Y., to Le Bourget Field, Paris, France.

May 22-30. International Reunion of Trans-Oceanic Fliers, under the auspices of the Royal Aero Club of Italy, at Rome.

May 27-30. Omaha, Neb., Air Races, including National Balloon Race, under the auspices of the Omaha Junior Chamber of Commerce.

May 28. Connecticut Model Airplane Meet, State Armory, Hartford, Connecticut.

May 29. Third Annual Sportsmen Pilots' Race at Patco Field, near Philadelphia, Pa., under the auspices of the Aero Club of Pennsylvania.

June 4-5. Air Show at Albany, N. Y., airport in connection with the dedication of Albany Seaport.

June 4-5. First Anniversary Celebration of Birmingham, Ala., Airport by Birmingham Aero Club.

June 6-8. Sixth Aeronautic Meeting, Aeronautic Division, American Society of Mechanical Engineers, at Buffalo, New York.

June 9-10. Pacific Coast Aeronautic Meeting, American Society of Me-

chanical Engineers, at the University of California, Berkeley.

June 12. Miniature Airplane Contest at Kansas City, Mo., under the auspices of the Kansas City Junior Aeronautics Club.

June 20-24. Thirty-fifth Annual Meeting of American Society for Testing Materials at Atlantic City, New Jersey.

July 2. Model Airplane Tournament at Seaford, Long Island, N. Y., under the auspices of Seaford Chamber of Commerce, Inc.

Week of July 10. Michigan Air Tour, under the sponsorship of the American Legion.

July 18-31. National Gliding and Soaring Contests, under the auspices of the American Soaring Association, Inc., at Elmira, New York.

August 19-21. Fourth Annual Canadian Air Pageant at Dominion Government Air Harbour, St. Hubert, Quebec, under the auspices of the Montreal Light Aeroplane Club, Inc.

August 21-27. International Reliability Tour for 1932, passing through Germany, Czechoslovakia, Austria, Italy, France and The Netherlands, under the auspices of the German Flying Club.

August 27-September 5. Eleventh Annual National Air Races at Cleveland, Ohio.

September 6. Aviation Day, marking opening of Travel Pageant, Atlantic City, New Jersey.

September 25. Gordon Bennett Trophy Balloon Races at Basel, Switzerland.

October. Texas State Fair, including aeronautical exhibits and events.

November 25-December 11. Thirteenth International Aeronautical Exhibition, under the auspices of the Syndical Chamber of Aeronautical Industries, in the Grand Palais, Paris, France.



### **Boeing School Lowers Tuition**

SUBSTANTIAL cuts in tuition costs, coupled with expansion of courses, have been placed into effect by the Boeing School of Aeronautics after three years of operation at its base at the Oakland Municipal Airport, Oakland, California.

The master pilot course, covering 250 hours of flying and 924 hours of ground school, is now offered at a cost of \$5,200. Other tuition prices are: Transport pilot course, \$3,400; limited commercial, \$1,060; private pilot, \$355; special master pilot, \$1,600; master mechanic, \$700; airplane mechanic, \$175, and engine me-

chanic, \$175.

New enrollments in the Boeing school begin on April 4, July 5 and October 3, 1932, and January 2, 1933. The partial payment plan applies to all courses, and the extended payment plan, whereby part of the tuition may be paid after finishing the course, applies to the transport pilot course and the master pilot course.

### **Ohio Treasure Hunt**

THE first of a series of Airplane Treasure Hunts will start from Watson Airport, Blue Ash, Ohio, at 10 a. m. on Sunday, May 8. The event is under the

auspices of Wedekind-Schmidlapp Flying Service, Inc.; Vermilya-Huffman Flying Service and Queen City Flying Service, Inc., and has for its purpose the advancement of amateur flying in Cincinnati and vicinity. The "treasure" will consist of two prizes, an engraved trophy and an aeronautical merchandise order, for first and second places, respectively.

Any pilot or airplane will be eligible to compete upon filling out an entry blank, which may be obtained from any of the three companies at the airport. Pilots may fly solo or may carry any number of passengers. There will be no entry fee. Ability of pilots and passengers to solve the clues rather than the speed of their airplanes will be the determining factor in finding the treasure. All of the clues will be located on established airports. In addition to control point clues, one or more clues may be hidden on each of the several airports.

The treasure hunt will cover not more than 150 miles. All contestants must return to point of departure by six o'clock of the same day. In case of unfavorable weather, the hunt will be postponed until the following Sunday.

### **Stinson Leads in Sales Volume**

STINSON AIRCRAFT CORP., a division of the Cord Corp., built and sold nearly fifty-three per cent of all cabin monoplanes manufactured in the United States during 1931, according to figures recently released by the Department of Commerce. The total number of cabin monoplanes of all sizes is listed at 338 for the year. Of this number, Stinson produced 179, or 52.9 per cent.

In the two classes of planes to which Stinson confines its activities, this leadership is even more pronounced, according to L. B. Manning, president of the Stinson company. Department of Commerce reports show a total of 154 four-passenger cabin monoplanes built during the year, of which Stinson produced 139, or 90.2 per cent. Of the fifty-eight multi-motored monoplanes reported, a total of forty, or 68.9 per cent, were Stinsons.

### **Lycoming Reports Gain**

AN increase of 88.4 per cent in the sale of Lycoming engines to manufacturers outside the Cord Corp. group during the first quarter of the fiscal year ending March 1, over the first quarter of 1931, was reported last month by W. H. Beal, president of the Lycoming Manufacturing Co. During the three months' period these sales totaled 3,807 airplane, automobile, truck and industrial engines, as compared with 2,015 in the same period last year. These figures exclude shipments to the Auburn Automobile Co. and the Stinson Aircraft Corp., with which the Lycoming company is affiliated through the Cord Corp.

## DIGEST OF RECENT EVENTS

### *A Brief Chronological Summary of the Month's Important Aeronautical News*

#### **Break Long-Distance Record**

TWO French aviators, Boussoutrot and Rossi, broke the world's long-distance and endurance record over a closed circuit. Time and distances flown were seventy-six hours and forty-three minutes and 6,625 miles. (March.)

#### **Orville Wright Honored**

The distinguished service medal was awarded to Orville Wright, co-inventor of the airplane, by the Civitan International Clubs at Dayton, Ohio. Previous recipients of the medal included Thomas A. Edison and Gen. John J. Pershing. (March.)

#### **Makes England-Cape Town Record**

J. A. MOLLISON, British holder of the speed record for an Australia-England flight, flew from England to Cape Town, South Africa, in the record time of four days, seventeen hours and nine minutes. (March.)

#### **"Graf Zeppelin" Completes Round Trip**

BREAKING speed records for carrying long-distance mail, the *Graf Zeppelin* completed its first round trip of a series to be flown between Friedrichshafen, Germany, and Pernambuco, Brazil. The return to Friedrichshafen was made in 84½ hours. (March.)

#### **Doolittle Makes Another Record**

MAJOR JAMES DOOLITTLE made a new unofficial record between St. Louis and Detroit, flying the distance in one hour and fifty-five minutes. (March.)

#### **National Aircraft Show**

RECORD-BREAKING crowds were attracted to the annual aircraft show held at Detroit, Mich., where military and commercial airplanes formed the

center of an exposition of the American aeronautical industry. (April 2-10.)

#### **Short Wave Radio Tested**

POSSIBILITIES of restricted radio communication were shown in tests conducted between a plane and amateur radio stations between New York and Boston. The plane was piloted by Joseph Lyman of Boston, who was accompanied by D. Kelly, radio operator. The American Radio Relay League directed the tests. (April 2.)

#### **Three-Way Aerial Broadcast**

THE first radio program in which three-way aerial conversations were broadcast was given in a United Air Lines and National Broadcasting Co. program. Three air mail pilots, flying their routes, cooperated in the broadcast, which was given in collaboration with the Post Office Department. (April 10.)

#### **French Break Cape Town Record**

GOULETTE and Salel, two French aviators, broke all Europe-Cape Town speed records in a flight from Le Bourget, France, their time being three days, nineteen hours and fifteen minutes. The flight was made in a 330-horsepower Farman Lorraine monoplane. (April 21.)

#### **Pangborn Honored by League**

CLYDE E. PANGBORN was presented with the annual trophy awarded by the Ligue Internationale des Aviateurs for the year's outstanding flight. The presentation was made in recognition of his trans-Pacific flight last fall from Tokio to the United States with Hugh Herndon, Jr. Mr. Herndon received a scroll descriptive of the flight similar to a scroll presented to Mr. Pangborn with the trophy. April 22.)

### Michigan Air Tour

TALBERT ABRAMS, head of the Abrams Aerial Survey Corp., has been named president of a permanent organization which will handle future Michigan Air Tours, according to an announcement made in connection with details of the 1932 tour. Leslie Kefgen of Bay City, department commander of the American Legion, which is sponsoring the tour, is first vice president of the tour association; Ed Forner of Jackson is second vice president and C. V. Burnette of Detroit, third vice president.

Lansing will be the finishing point for the 1932 tour, which will be held during the week of July 10 over a route largely centered in the upper Peninsula. Detroit was chosen as the starting point. Other places to be visited by the tour planes in the order named are: Bay City, Alpena, St. Ignace, Sault Ste. Marie, Newberry, Munising, Marquette, Ontonagon, Calumet, Crystal Falls, Iron Mountain, Escanaba, Manistique, Charlevoix and Houghton Lake.

The general expenses of the tour this year, both to the cities along the route and to the participants, will be greatly reduced. The number of ships in the tour will be limited to forty instead of the usual fifty. The price for pay passengers will be cut from two hundred to ninety-nine dollars, and the entry fee, from fifty dollars to twenty-five. The Legion will extend invitations to many prominent pilots and to the Army and Navy to participate in the tour.

Tentative plans are under way to hold the third annual Junior Chamber of Commerce Air Circus at the Lansing airport to coincide with the finish of the tour. The two previous air meets staged by the Junior Chamber proved very successful. Most of the profits were turned over to the city for further airport development, making possible the grading

of the present runways, installation of a new runway and of a pump and a deep well for a water supply on the field.

### Hancock College Activities

THE advanced engineering class at Hancock Foundation College of Aeronautics, Santa Maria, Calif., was graduated on April 29. A number of the graduates will remain at the college to do post-graduate work and acquire more practical experience while working on the series of light planes now being developed at the school.

Tests are being run in the college wind tunnel on several types of airfoils, one of which is a marked departure from the conventional type. Tests are also under way on a lift-increasing device developed at the college. Several of the advanced engineering class have been conducting tests on models of their own design.

Work on the light plane designed and now in process of construction at Hancock Field has progressed rapidly. The plane will be powered with a Continental A-40 engine and is to be test-flown soon.

### Pilots and Aircraft Listed

A TOTAL of 17,628 pilots and 7,476 aircraft held active Department of Commerce licenses on April 1, 1932, according to a study just completed by the Aeronautics Branch of the Department of Commerce. The total number of aircraft, licensed and unlicensed, of which the Branch had record on April 1 was 10,672, unlicensed craft bearing identification numbers only, amounting to 3,196.

Among the persons holding pilots' licenses as of April 1, 6,929 were of the transport grade; 1,439, limited commercial; thirty-eight, industrial pilots, and 9,222 in the private classification. Women pilots, totaling 512, were divided as fol-

lows: Transport, forty-four; limited commercial, fifty-two; industrial, one, and private, 415.

New York led the states in the number of aircraft, licensed and unlicensed, with 1,203. California was second with 1,193 and Illinois, third with 719. Considering licensed aircraft only, the report placed California first with 968; New York followed with 951, and Illinois was third with 501. In the number of licensed pilots, California led with 3,380; New York was second with 1,787, and Illinois third with 1,097.

Licensed gliders numbered eighty, and unlicensed gliders, 1,203, making a total of 1,283. Licensed glider pilots were reported as 262. The greatest number of gliders in a single state was in California, where there were 232. New York was second with 135, and Michigan, third with 118. California also led in the number of licensed glider pilots with eighty-four, while New York had fifty-one, and Illinois seventeen.

### Olympic Flying Prohibitions

AVIATORS flying in the vicinity of the Olympic Games, which are to be held in the region of Los Angeles, Calif., July 30 to August 14, must not fly at an altitude of less than 1,000 feet over any of the open-air stadiums or areas where competitions occur and persons are assembled. Such a procedure would constitute a violation of the Air Traffic Rules of the Air Commerce Regulations, according to an announcement by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

Aviators are requested to refrain from flying over the Olympic Village, being constructed on the Baldwin Hills, during the period starting immediately until September 1. The Village will house approximately 2,000 athletes participating in the games.

### Suggest Precision Contest

THE U. S. Amateur Air Pilots' Association has drafted rules for a precision contest which it is proposed to inaugurate in the National Air Races next summer, if it meets with the approval of the committee in charge. The ability of the entry to pilot an airplane would be judged from the take-off to the final landing.

Under the rules of the contest, the pilot shall climb to 1,500 feet and perform five maneuvers: Immelmann, right and left; three consecutive loops; chandelle; two right and three left spins, coming out parallel with the grand stand; landing to a mark with idle throttle. As a result of the competition, five men and five women would be declared the ranking pilots of the year, and one from each group would be chosen national amateur pilot champion.



Charles Hall all-metal airplane with center landing wheel

Acme Photo

### Fechet Heads Pageant Board

MAJ. GEN. James E. Fechet, national defense editor of *AERO DIGEST*, has accepted the chairmanship of the Honorary Aviation Board of the National Travel Pageant, among the members of which is Second Assistant Postmaster General Irving Glover. Lieut. Walter Hinton has been appointed Director of Aviation Events for the travel pageant to be held at Atlantic City, N. J., during the week following Labor Day. Lieutenant Hinton will be assisted by R. A. Y. Washburn as associate director.

Among aeronautical organizations that have assured their cooperation in Aviation Day on September 6, the opening day of the celebration, are the Ninety-Nines, the Betsy Ross Corps, the Aviation Country Clubs of New York, the Aviation Clubs of Pennsylvania and the U. S. Amateur Air Pilots' Association. Aviation Day will include a program of races, exhibits, a parade and a banquet.

### Air Rules Violations Decrease

TWO hundred twenty-seven violations of the Air Commerce regulations during the first quarter of 1932 were dealt with by the Aeronautics Branch, Department of Commerce, according to an announcement by Gilbert G. Budwig, Director of Air Regulation. This figure represents a decrease of 104 as compared with 331 violations for the last quarter of last year.

Violations of the provision of the Air Commerce Regulations pertaining to acrobatics led the list of specific offenses with fifty cases. Thirty-eight broke the low-flying provision of the regulations. Other specific violations during the first quarter of 1932 included: Unlicensed pilot flying licensed plane, twenty-two; flying without navigation lights, eight; flying without identification numbers, two. The miscellaneous offenses numbered 107.

During the quarter the Aeronautics Branch collected civil penalties in the amount of \$365, of which \$165 were for penalties assessed during this period, the remaining \$200 applying to penalties previously assessed. Civil penalties were made against forty persons during the first quarter of the year. Thirty-five reprimands, seventy-eight suspensions, twenty revocations and six denials of licenses were imposed for violations. In forty-eight cases, evidence was produced which justified dismissal.

### Air Cab Operators Meet

PROMINENT flying field operators attended the first annual meeting of the Stinson Air Cab Operators' Association, held in Windsor, Ont., on April 7. It was decided that more personal solicitation, followed by direct-mail and magazine advertising, and the clearing of

business-promotion ideas through an association secretary would best serve the purpose to aid civic consciousness toward airports and their activities.

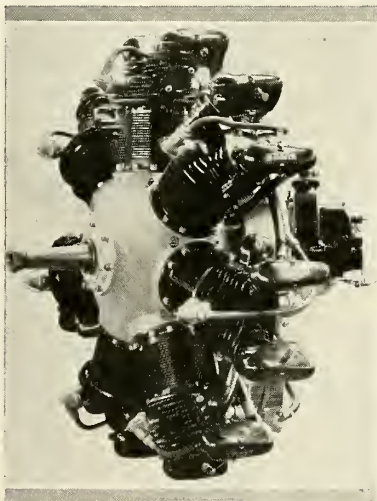
Officers of the association are: Lawrence Enzlinger, Omaha, Neb., president; John Parker, Sandusky, Ohio, vice president; Dick Leferink, Casper, Wyo., vice president, and Frank X. Mara, Wayne, Mich., secretary and treasurer.

### Soviet Contemplates Alaskan Line

A SERIES of explorations this summer will be made under Soviet sponsorship to decide the advisability of airline establishment across Bering Strait to Alaska and over polar regions to northern points on the American continent. One exploring expedition will be under Soviet government auspices, while the All-Union Arctic Institute will institute another investigation of the Arctic region.

### Ludington Increases Wages

SALARIES of employees of the Ludington Airlines, Inc., have been raised by the company, according to a recent announcement. Ludington officials said that the prospect of good flying weather and a busy season justified the increase.



145 h.p. 7-cylinder Warner engine

### New Warner Engine

THE Warner Aircraft Corp. of Detroit has produced a new static radial air-cooled, four-cycle engine. It has seven cylinders with bore of 4 $\frac{5}{8}$ " and stroke of 4 $\frac{1}{4}$ " and a compression ratio of 5.3:1. The rated power is 145 horsepower at 2,000 r.p.m., and the dry weight, without hub or starter, is 300 pounds, giving a specific weight of approximately two pounds per horsepower.

The new engine supplements, with greater capacity, the five-cylinder, ninety-horsepower and the seven-cylinder, 110-horsepower Warner *Scarab* engine.

### R. S. Damon Heads Curtiss-Wright Co.

THE election of Ralph S. Damon as president of the Curtiss-Wright Airplane Co., the commercial manufacturing division of Curtiss-Wright Corp., was announced recently by Thomas A. Morgan, president of the corporation. Mr. Morgan stated that plans for 1932 include a limited production of the Travel Air Speedwing and Sport models, powered with Wright *Whirlwind* engines, and the development of new transport planes for airline and mail operation.

Mr. Damon, who succeeds Walter Beech, is a graduate of Harvard University and Massachusetts Institute of Technology. In 1922 he joined the engineering department of the Curtiss Aeroplane & Motor Co. and in 1923 became superintendent of the Garden City, Long Island, factory, which position he occupied for five years. In 1928 Mr. Damon was transferred to St. Louis as factory superintendent and vice president of the Curtiss Robertson Airplane Manufacturing Co., the commercial manufacturing division of the Curtiss group. He was made vice president in charge of production of the Keystone Aircraft Corp. at Bristol, Pa., in 1931, where he supervised the manufacture of bombers for the Army and flying boats for the Navy. Mr. Damon will make his headquarters at St. Louis.

### New Company Makes Stibloy

THE Stibloy Products Co., Inc., with headquarters in the Koppers Building, Pittsburgh, has taken over the assets of Liquid Metal Products, Inc., of Chicago, producers and distributors, under the Arent patents, of Stibloy, a metal compound in liquid form which acts as a primary coating to hold paint, enamel and lacquer, permitting immediate finishing of new galvanized metal surfaces. The substance will be manufactured in the various plants of the Koppers Products Co., which controls the Stibloy Products Co., Inc.

Officers of the new company are: President, J. N. Forker; vice president, S. H. Bell; secretary, John D. Shaner, and treasurer, S. T. Brown.

Stibloy was developed to extend the life of galvanized surfaces by protecting them from the effects of atmospheric conditions and from the damage caused by exposure to gases, acid fumes, smoke and brine. It is used as a primer for protecting and preserving galvanized roofing, siding, sheeting, guttering, downspouts, wire fencing, air ducts, car roofing, screens, nails, transmission towers and other galvanized products. Applied to poster panels and paint bulletins, it is designed to assure permanent adhesion for paint, lacquer and paper on the fronts of signs, and to retard corrosion on the backs.

### Ellsworth Antarctic Expedition

AN EXPEDITION to make a non-stop flight of 2,900 miles across the Antarctic Continent and return is planned to start next September by Lincoln Ellsworth and Bernt Balchen, according to recent reports. Originally planned for 1933-34, the expedition has for its purpose the crossing by airplane over the 1,450 miles separating the Ross Sea and the Weddell Sea and return without landing, Balchen acting as pilot.

According to the American Geographical Society, the expedition will attempt a voyage of discovery to determine geographical features of the practically unknown mass of land to be covered by the flight. All prominent features will be photographed during the flight, a record will be kept of weather conditions, and notation made of the character of the ice surface for use by future ground expeditions.

Ellsworth and Balchen will go from California to the Ross Sea by way of Australia. Both fliers are experienced explorers of the polar regions. Ellsworth was a partner of Raoul Amundsen in two North Pole expeditions, one of which crossed the Pole in the *Norge* under the command of General Umberto Nobile. Balchen also was associated with the Amundsen-Ellsworth expedition in a minor capacity. Later he was a member of the crew of Byrd's *America* on its flight to France and was chief pilot on the Byrd Antarctic expedition, flying over the South Pole.

### "Believe It or Not" Contest

A "BELIEVE IT OR NOT" contest in which a Curtiss-Wright monoplane with a complete course of lessons at a well-known flying school is featured will begin May 3. The contest will be effective in some newspaper in almost every city in the United States from May 3 to May 16.

R. L. Ripley, originator of "Believe It or Not," will arrive in New York May 4 to resume his radio appearances over WJZ on a National Broadcasting network. In order to make the best possible speed from the Pacific Coast he will fly, being piloted from Pittsburgh to New York by "Casey" Jones, vice president of the Curtiss-Wright Corp. Ripley has been in the South Seas and the Far East for the past three months.

### Stearman Changes Policy

THE Stearman Aircraft Co. has announced that its primary purpose will be to act as a service organization for all models of Stearman planes, *Alpha* and *Beta* models of Northrop planes and Hamilton Metalplanes.

Jigs, dies and engineering data for such aircraft will be available at the

Stearman plant, and a stock of raw material and certain replacement parts will be available to all owners or operators of these ships. All models of the Stearman *Junior* and *Senior Speedmail* series, the Stearman *Cloudboy* series and the Stearman *Business Speedster* series will be continued, but will be built only to customer order. Northrop *Alpha* and *Beta* models will be discontinued and will not be offered for sale until further notice.

### Allard Describes Changes

J. S. ALLARD, president of the Curtiss-Wright Flying Service, announced last month several changes affecting the organization. J. W. Donahey has been transferred from the New York office and appointed manager of the Curtiss-Reynolds Airport, Chicago, to take the place of K. S. Day, who has resigned. Mr. Donahey will also be in charge of the Curtiss-Wright airport at Milwaukee. Douglas Harris will be assistant manager at Milwaukee, replacing Paul W. Trier, who has resigned.

The Aerial Surveys and Photographic Division, formerly located at 350 West 31st Street, New York, has been transferred to the general office at 27 West 57th Street, New York City.

### Exchange Clubs Aviation Banquet

MAJ. GEN. James E. Fechet, national defense editor of AERO DIGEST, was the principal speaker at the fifth annual aviation banquet of Council Number One, Exchange Clubs, in Detroit, April 5. In addition to guests of honor prominent in the aeronautical field, the official guests included officers of the National Exchange Club and of Michigan affiliated Exchange clubs.

### To Stress Aviation in Journalism

AVIATION'S part in news-gathering will be emphasized in the program of Journalism Week at the University of Missouri School of Journalism, May 1 to 7, at Columbia, Missouri. Two-way communication will be attempted with Journalism Week banquet speakers as part of an official test flight on May 6, while air photos of the banquet features will be taken.

Col. Halsey Dunwoody, vice-president of American Airways, Inc., will address guests at the banquet from the plane in which he will fly to Columbia from St. Louis. Another speaker at the banquet will be James V. Piersol, aeronautics editor of the Detroit News. Mr. Piersol will fly a Lockheed *Vega* monoplane from Detroit in the afternoon, carrying with him the noon edition of his newspaper.

It is planned to have an autogiro flown to Columbia by the American Autogiro Co. If weather conditions permit, the machine will land on the campus of the

university. Maj. Phil Love, commander of the 110th Aero Squadron of the 35th Division, Aviation, of the National Guard, has been invited to bring his squadron of nine planes to Columbia for the celebration.

### Reorganize Boeing Plant

THREE new shops were created last month in the production section of the Boeing Airplane Co. They are the control surface shop, created to manufacture the control surfaces formerly produced in the sheet metal department; the body shop, organized to handle the construction of all airplane bodies, and the bench shop, taking charge of the bench work that was formerly conducted in the machine shop.

Another feature of the reorganization of the Boeing plant was the allocation of all wing construction, wood and metal, to an expanded wing shop. In the past, metal wings were made in the sheet metal department.

Appointment of J. H. Q. Dohse to the position of assistant superintendent of the Boeing plant was announced by the company. Mr. Dohse was formerly production engineer in the engineering department.

### Ruth Nichols on Good-Will Tour

RUTH NICHOLS left April 15 on a 3,000-mile good-will tour for the National Council of Women. Her flight will include stops at Pittsburgh, St. Louis, Tulsa, Oklahoma City, Wichita, Kansas City, Des Moines and Chicago. The object of the tour is to collect petitions signed by club women, asking foreign governments to send distinguished representatives to the International Congress of Women to be held in Chicago in 1933. Miss Nichols is making the flight in a Lockheed Vega, powered with a Packard Diesel engine.

### Boeing Finishes Army Contract

DELIVERIES on a contract calling for 130 *Wasp*-powered P-12E and P-12F type airplanes for the Army Air Corps were completed last month by the Boeing Airplane Co., when fifteen airplanes were ferried from Seattle to March Field, Riverside, Calif., by pilots of the 20th Pursuit Group.

The contract was awarded the Boeing plant by the Government last year, and construction on the single-seater monocoque fuselage biplanes was begun last summer. Deliveries were started in September and continued throughout the past winter. One of the last P-12F's to leave Seattle was fitted with a cockpit enclosure and the plane was flown east to Dayton, where Materiel officers at Wright Field were to test the enclosure.

(Continued on following page)

# HIGHER PERFORMANCE

# • LOWER COST

To increase performance *and at the same time reduce cost . . .* that is a real achievement!

That is exactly what has been done in the new CG Compass. Elgin Engineers, cooperating with the Army Air Corps, designed this model with a spring suspended card which has proved far superior to any previous types. It is lighter, more compact, and is especially satisfactory under excessive vibration as it will not spin.

The simplification of design, plus Elgin's many years of experience in building fine instruments, permits manufacture at a price far below that of any compass previously built to meet Army Air Corps requirements. Elgin has exclusive rights to manufacture this compass for commercial use.

Exclusive distributors for International electrically operated flares, approved by the Department of Commerce. We will gladly send you an illustrated catalog of these flares on request.



TYPE CG COMPASS

**\$30**

# ELGIN INSTRUMENTS

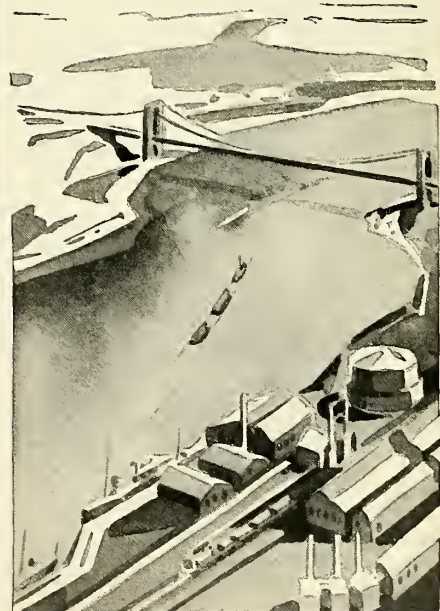
ELGIN NATIONAL WATCH CO.  
ELGIN, ILLINOIS



CONTRIBUTING TO SPEED AND SAFETY IN THE SKY



**A** spacious cabin with every convenience for the comfort of nine passengers and their luggage... a cruising speed of 160 miles an hour and ample reserve power to cope with the most adverse head wind... a rugged construction that means long life and minimum maintenance—make **THE MODEL 17A FLEETSTER** a highly profitable carrier for progressive transport operators who would retire obsolete equipment, speed up their schedules, and reduce their operating costs. Facts and figures on request.



CONSOLIDATED AIRCRAFT CORPORATION • BUFFALO • N. Y.

## NORTHEAST

CAPT. FRED L. SMITH, operations officer of the 112th Observation Squadron, 37th Division, and instructor in aeronautics and automobile engineering at East Technical High School, Cleveland, has been appointed State Director of Aeronautics by Governor George White of Ohio. Captain Smith was educated in the Cleveland Public Schools and was graduated in 1917 from the College of Education at Ohio State University. He is 37 years old.

REDUCTION of landing fees for fleet airplane operators at Port Columbus has been made by the City Council. Under the old rate operators paid \$500 for the first daily schedule, and \$500, less twenty per cent, for each additional schedule. Under the new rate a maximum fee of \$1,200 per year is listed for five schedules and \$1,700 for the first ten.

AN aviation commission representing Soviet Russia and headed by G. I. Silin, vice-president of The All-Union Civil Aviation Trust of Moscow, recently visited The B. F. Goodrich Co. at Akron, Ohio, to obtain complete information on aircraft de-icers developed by Goodrich engineers. The Goodrich device employs compressed air to pulsate streamlined rubber tubes along the leading edges of the wings and tail surfaces, removing ice in flight as rapidly as it forms.

FIVE members of the Western Aero Club, an aviation group composed of students at the West Philadelphia High School, Pa., have enrolled for a flying course. The club has in its possession many airplane parts, a few aircraft engines and other accessories, which the students use for instruction in the ground school course conducted by the club.

THE Norma-Hoffmann Bearings Corp. of Stamford, Conn., manufacturers of "Precision" ball, roller and thrust bearings, announces the removal of its New York sales office from the Grand Central Terminal to new and larger quarters in the Commerce Building, 155 East 44th Street.

THOMAS B. EASTLAND, JR., of Burlingame, Calif., has been elected president of the Harvard University Flying Club for next year. Charles C. Rumsey of New York was elected vice president. Other officers include: John Cheever Cowdin of New York, secretary, and Beekman L. Fairbank of Cold Spring Harbor, L. I., treasurer. Isaac Harter, Howard Lapsley and Archibald M. Brown, Jr., will be directors of the club.

THE Darling Flying Service, Inc., of Auburn, Me., has recently developed a

new airplane ski designed for high efficiency with light weight. The wood used is selected rock maple, which is specially treated with oil to overcome freezing or sticking to snow surfaces. The pedestal, which is of streamline design, and the fittings are of heat-treated aluminum alloy, combining strength with lightness. It is approved by the Department of Commerce.

The manufacturers, headed by Frank W. Darling, are offering these skis in models for planes up to 5,000 pounds.

## SOUTHEAST

A MODERN repair hangar will be constructed at Logan Field, the temporary municipal airport at Baltimore, Md., by the city of Baltimore and will be equipped and operated by the Aerogenius Co., Inc., of Baltimore, Maryland. The Aerogenius company will receive a two-year contract by which the city will receive from the company \$450 a year, plus ten per cent of the gross receipts in excess of \$8,000. Because of this arrangement Logan Field becomes a municipal airport under Federal regulation, which specifies airports at which repair service may be obtained.

Following an inspection of the new municipal airport now under construction, Mayor Howard A. Jackson stated it would not be ready for at least another two years, and consequently Logan Field would be used for that period. He also stated that the city's lease on Logan Field, which expires in June, must be renewed. Approximately \$3,000,000 has already been spent on the new airport of the \$4,500,000 which has been appropriated for it through airport loans.

ANNOUNCEMENT has been made of the sale of the Weeks Aircraft Corp. at Charlotte, N. C., of which Elling O. Weeks, Milwaukee, Wis., was president. The Weeks company operated the Charlotte flying field and conducted a flying school and flying service. The transaction included the transfer of three airplanes and other equipment, the lease on the airport and a franchise for a line to Miami, Florida. W. G. Swan of Atlantic City, N. J., and V. R. Farrow of Asbury Park, N. J., were the buyers. They plan an airline from Charlotte to Memphis, Tennessee.

CHANGE of ownership of the Roosevelt Flying Service of Florida, which has had its headquarters in West Palm Beach for five years, was announced by George G. Paris of Janesville, Wis., and Chicago, who has taken over the organization. Mr. Paris will act as president and general manager; B. M. Willis is secretary. They purchased the airport and flying company from Art Williams and Charles Collar, Lake Worth.

A CHART has been compiled by John W. Nestler of Tampa, Fla., showing the distances from Tampa to twenty-eight other Florida cities by airplane and by auto, giving the air routes a decided advantage.

THE newly formed Sky Harbor Glider Club of Deland, Fla., has received a Waco glider with a wing span of thirty-six feet. Officers of the club are: Leslie Dyer, president; Frank Davis, secretary-treasurer; Frank Fish, field manager. Mr. Davis is manager of Sky Harbor Airport, three miles northeast of Deland. The airport company is dealer in Waco gliders, Davis and Stinson monoplanes and Taylor Cubs.

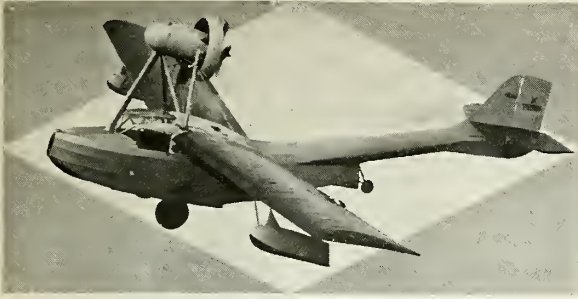
R. B. BROSSIER has been elected chairman of the Consolidated Civic Aviation Committee recently formed in Orlando, Florida. Howard Lott was made secretary-treasurer, and Lieut. E. C. Nilson, manager of the Orlando Municipal Airport, was chosen as technical director. The purpose of the committee is the promotion of aviation in Florida, to secure the establishment of a series of emergency landing fields and the cooperation of the civic clubs of various cities along the route between Jacksonville and Tampa. April 29 and 30 were selected as the dates for the annual aviation show in Orlando.

## NORTH CENTRAL

THE Kohler Aviation Corp. has moved into new quarters in the Bankers' Building, Milwaukee, Wisconsin. The office, which is in the charge of William F. Pabst, vice president, recently reported an increase in both passenger and express totals over a year ago. The first night airplane flight ever made across Lake Michigan was successfully completed recently by the Kohler corporation as an experiment. An amphibion plane flown by Chief Pilot E. L. McMillan and carrying Edward Barrett, general superintendent, as co-pilot and Norman M. Dawson, treasurer, as passenger, covered the 110 miles in one hour and twenty minutes. The trip was made from the Grand Rapids, Mich., airport to the Milwaukee county airport, over eighty-five miles of open water without the assistance of beacons or radio, using only the compass and stars for guidance. It is expected that night service, carrying freight and express, will be started before the end of the summer by the Kohler company.

CONTROL of the Midwest Air Transport Co., operators of the Madison, Wis., airport, has been taken over by Louis F. Schoelkopf, who has been conducting the field since last summer.

(Continued on following page)



## No longer need price prevent your owning an amphibion

LESS than \$10,000 is the price of the new PRIVATEER III, first and only high speed cabin amphibion selling at so low a figure. ¶ This is an amphibion country by virtue of its thousands of miles of inland and coastal waterways. Sportsman pilots and commercial operators now can afford to broaden their flying activities and utilize the airplane throughout its entire scope of usefulness. Dealers, too, can approach prospects who up to now have been "cold" because of the high-cost situation which the PRIVATEER III has overcome. ¶ With the Continental R-670 of 215 h.p. the PRIVATEER III carries three (and luggage) in a comfortable, well appointed cabin at 120 m.p.h. The cabin, sound-proofed and ventilated, is equipped with sliding windows, dual controls, windshield wiper and a sliding door on each side. ¶ Among other important features are the automatic, positive-action retractable landing gear; the non-corrosive hull structure; shock absorber-equipped wing tip floats; location of the pilot forward of the leading edge, etc. ¶ If you will write or call, we shall be glad to furnish complete technical data and other information—and to arrange a demonstration flight.

# AMPHIBIONS, INC.

Dept. AD5, Garden City, Long Island, N. Y.

Top speed, 120 m.p.h....cruising, 100 m.p.h....span, 42'5"....length, 30'....height, at rest on ground, 11'7"....power, 215 h.p. Continental R-670....new type Townend Ring....Heywood Injection Starter....low pressure tires....fuel level gauge....tachometer....oil thermometer....altimeter....air speed indicator....compass....tools....anchor....rope....fire extinguisher.

READY-MADE ENTIRELY OF STEEL

# BUTLER

READY-MADE HANGARS



COMPLETENESS, economy in acquiring, economy in maintenance, fire safeness, speed in erection, appearance and structural qualities which make for permanence, yet which permit enlarging or taking down and re-erection—all these are Butler Ready-made Hangar characteristics. Their sum total is the common sense solution of the airplane sheltering problem.

Sizes range from the large airport types with clear spans of 80 feet or more down to the individual T-shaped, round or gable roof hangars for any size airplane. Air stations along transport lines, flying school hangars and training quarters, plant buildings for aircraft factories, ground equipment and material warehouses and repair shops are some of the many other air industry purposes served by Butler Ready-made Steel Buildings. Butler designs include combinations of steel and stucco and steel and brick veneer.

SIZES AND TYPES FOR ALL PRIVATE AND COMMERCIAL PURPOSES

## BUTLER MANUFACTURING COMPANY

1234 Eastern Ave.  
KANSAS CITY, MO.

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MINNEAPOLIS, MINN.

Send information and proposal on Ready-made Steel  Individual Hangar, Size ..... x ..... feet;  Commercial Hangar, Size ..... x ..... feet.

Remarks \_\_\_\_\_

Firm Name \_\_\_\_\_

By \_\_\_\_\_

Address \_\_\_\_\_ State \_\_\_\_\_

(Continued from preceding page)

The property consists of ninety-three acres, and the field is equipped with two modern hangars, a tower with a revolving beacon and an improved floodlighting system.

PLANS for the improvement of Whiting airport, located between Menasha and Appleton, Wis., and a campaign to stimulate interest in aviation have been launched by the Fox River Valley Aeronautical Association, of which James H. Kimberly of Neenah is president. The society plans to start a campaign soon to enroll aviation students for training at both the Whiting and Larsen airports. It will also promote an air meet, tentatively scheduled for next July. The meet will be preceded by a state-wide tour.

APRIL 4-9 was designated as Air Mail Week in Duluth, Minnesota. The drive consisted of luncheon, radio and other talks, newspaper publicity and editorials, window displays, etc., under the direction of the Duluth Aviation Club, which was assisted by the Junior Chamber of Commerce.

THE Hanford Airlines inaugurated daily passenger service between Sioux City, Iowa, and Saint Paul, Minn., on April 1, with Mankato, Minn., being added as a flag stop about a week later.

THE Saint Paul Aviation Club has set May 15 as the tentative date for the dedication of the large memorial to Charles W. (Speed) Holman at the Holman municipal airport of Saint Paul.

## SOUTH CENTRAL

AN extensive survey to determine the extent to which the air mail service is being used by St. Louis business firms and to ascertain what action can be taken further to improve the service has been undertaken by the Air Board of the St. Louis Chamber of Commerce. Questionnaires seeking the desired information have been sent by the organization to most of the leading business concerns of the city. Each firm is asked to outline the extent to which it is using the air mail service, to state what can be done to bring about its increased use and to suggest constructive plans for further improving the service. The firms are asked to state whether they use the service to maintain a close contact with their trade in the territory and also whether they use air mail collection schedules in the course of their mailings.

The information obtained in the survey, according to George B. Logan, chairman of the Chamber of Commerce Air Board, will be used as a basis for a

campaign to stimulate increased use of the mail service and for helping operators better to serve the public.

NIGHT air passenger service from Omaha to Kansas City and from Kansas City to St. Louis was inaugurated recently by American Airways. The first of the line's new Pilgrim monoplanes opened the service, arriving at Kansas City at 7:45 and leaving for St. Louis at 8:09. No passengers are carried on the night planes flying West. Kansas City is also a midpoint on the night air passenger service of the N. A. T. division of United Air Lines on the Chicago-Dallas run.

THE Airways Ticket Office at 1104 Baltimore Avenue, Kansas City, Mo., has been taken over by Braniff Airways, who will operate it on a trial arrangement. American Airways has moved its downtown ticket office in Kansas City to 1103 Baltimore Avenue, with Miss Dorothy Werner in charge.

DR. JOHN BROCK of Kansas City made his 865th consecutive daily flight recently, in spite of a high wind and a dust cloud that obscured the ground. Dr. Brock has visited every state in the Union on his air tours.

MIAMI AIRPORT, INC., operating single-motored four-passenger Verville aircoaches, started an intermittent passenger service recently between Miami, Okla., and Oklahoma City and Kansas City. A round trip will be flown between Miami and each of the other cities three times weekly, reaching Oklahoma City Mondays, Wednesdays and Fridays, and Kansas City, Tuesdays, Thursdays and Saturdays. George Coleman is backing the organization.

GUARDS at the Oklahoma state penitentiary have been ordered by Warden Sam Brown to fire on airplanes that fly over the prison at an altitude of less than 1,500 feet. Special long-range rifles have been furnished to the guards.

CHARTER of incorporation was granted the Associated Airways, Inc., Oklahoma City, Okla., air ticket office, April 15. Capital stock is \$2,500. Incorporators are Roy F. Brogan, E. E. Couch and Mayarene Johnson, all of Oklahoma City. The company will maintain a waiting room for the convenience of patrons, deliver tickets to passengers and make hotel and taxi reservations without any charge to the customer. Tickets for twenty-one airlines are handled through the downtown office.

H. C. DUNCAN of Tulsa, Okla., has been named manager of the consolidated

ticket office at the new Oklahoma City municipal airport administration building. Duncan formerly was connected with the Safeway Airlines at Oklahoma City and recently has been in the Braniff Airways, Inc., ticket office in Tulsa.

A NEW municipal landing field will be established on a site near Springdale, Ark., by the Springdale Community Club.

## NORTHWEST

THE Spokane, Wash., radio range beacon station, or directive beam station, the last of the six installed in the Pacific Northwest by the airways division of the Aeronautics Branch of the Department of Commerce, will be completed about May 15, according to a recent announcement by Charles Larsen, assistant airways traffic supervisor, who has charge of all the system in Oregon and Washington. Other stations under his supervision are located at Pasco, Portland, Medford, Tacoma and Grand Dalles.

AN extensive program for improving the Mueller-Harkins airport, Tacoma, Wash., including installation of boundary and floodlights for night flying, is planned. The Mamer Air Transport has installed a teletype system connecting Boeing field, Seattle; Tacoma field and the Mueller-Harkins port for reports on weather and flying conditions. The Mueller-Harkins port also has a fifteen-watt radio station. George Fisher is manager of the field and operator of the station.

ADCOX SCHOOL, INC., of Portland, Ore., and the Bacon Aircraft Repair depot at Vancouver, Wash., have been certified by the Government as authorized repair stations. Except for such a certificate held by Varney Air Lines, the ratings are reported to be the first of their kind awarded in the district.

IN a recent test flight between an autogiro, piloted by King Baird, and a Bird training biplane, piloted by Cecil Pounder, the former was judged to give the best performance in landing and the biplane was decided to be the best climber. The tests were held at Rankin airfield, Portland, Ore., the judges being: Major Howard C. French, aeronautics inspector for Oregon; Edith Foltz and Tex Rankin.

THE Alaska-Southern Airways, Inc., has recently been incorporated at Seattle, Wash., with capitalization of \$10,000. Incorporators of the concern are: W. A. Castleton, N. Bez and Ausel Eckmann.



# This Vacation



## TRAVEL BY AIR

**D**O you realize that airline rates have been reduced to the point where now they closely parallel rail plus Pullman fares? Like thousands of other vacationists this year you probably will want to take advantage of the facilities and conveniences offered by air travel.

New scenes, new places, new conceptions of time and speed await the aerial vacationist whose travel radius previously has been restricted by the limitations of surface vehicles.

With the cooperation of *Postal Telegraph*, AERO DIGEST is prepared to assist you with information and suggestions concerning vacation travel by air. Write us, and we will send you gladly complete data on

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*A local representative will call you promptly, offering to answer any question in connection with your trip by air, deliver your flight ticket order, and to help you in any possible manner, as you desire.*

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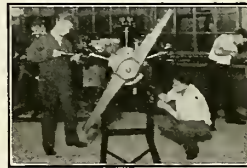
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## Half Million Dollar School

One of the largest and most successful in the East . . . Sponsored and recommended by many of the most famous figures in Aviation.



## Complete Mechanics Course



The most comprehensive aviation mechanics course in the country, including over 500 hours of actual instruction. Course includes building and repairing engines, fuselages, wings, etc.—preparing you for positions in airplane factories or flying field repair shops.

## Thorough Flying Course

Taught with care and precision by licensed transport pilots using government-licensed airplanes. Includes thorough and complete ground instruction—preparing you for pilot-license examinations.



## Army Trained Instructors

**Day and Evening Sessions** Comfortable dormitory facilities for out-of-town students, with use of gymnasium and swimming pool.

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Dept. AD-5, 1115-1125 Bedford Ave., Brooklyn, N. Y.

Please send me free illustrated pamphlet No. 25.

(Check course in which interested)

- ..... Aviation Mechanics
- ..... Flying and Ground Instruction

Name.....

Address.....

City..... State.....

## SOUTHWEST

A CODE of safety regulations to apply to aircraft operators in California is being prepared by the aeronautical committee of the State Chamber of Commerce.

AN all-day aviation program to be featured by an "On to the Olympic Games" derby for a \$1,000 first prize will be sponsored by the aeronautical committee of the Oakland Junior Chamber of Commerce, Rheule Reitze, chairman, announced recently.

THE T. C. Ryan Aeronautical Co., distributors for Great Lakes planes in southern California, has announced the sale of two more of these Cirrus-powered ships in the Los Angeles territory.

JACK EVANS recently established a record for the northbound Los Angeles-San Francisco flight when he landed a Varney Air Service plane at San Francisco Bay Airdrome ninety-nine minutes after the take-off from the southern terminal. The plane carried six passengers. The southbound record is eighty-eight minutes.

THE Federal Weather Bureau has established an observation station at Sandberg, on top of the Tehachapi mountain range. The key station in this area formerly was located at Lebec. Weather information collected at Sandberg is to be transmitted by teletype to other coast stations.

DESIGNED for freight service by Claire K. Vance, veteran air mail pilot, a flying wing is under construction at the plant of Vance Aircraft, Inc., Oakland municipal airport. The craft has a span of fifty-five feet and is powered with a supercharged Wasp engine. Test flights are scheduled for May.

A TOTAL of 7,900 passengers were carried by 4,155 planes arriving at and departing from San Francisco Bay Airdrome during March. Oakland Municipal Airport recorded 2,122 passengers and 7,408 landings.

THE San Francisco Bay Airdrome, Alameda, is now the northernmost port of call for Century Pacific airliners since the reorganization of the schedules of this newest unit of American Airways. Century planes for Los Angeles and intermediate points will now leave the Airdrome at 7:10 and 10:10 a. m. and 1:10 and 5:10 p. m. The 7:10 a. m. flight does not operate Sundays. On Saturdays an extra flight is scheduled for 3:10 p. m. Departures on the valley service to Stockton, Merced and Fresno remain at 9:10 a. m. and 5:10 p. m.

THE State Chamber of Commerce of California has opened an information bureau to acquaint the traveling public with airline operations in California. Information covering transport operations and complete records of all air mishaps will be compiled by the bureau. Representatives of the major companies are working with members of the State Chamber's aeronautical department in putting this bureau into operation.

## TRADE LITERATURE

### *New Pamphlets and Books of interest to the Aeronautical Industry*

#### *Steel Buildings Catalog*

THE International Derrick & Equipment Co. of Columbus, Ohio, has published a booklet about Ideco standard steel buildings. Various sections of the catalog cover the six outstanding features of Ideco buildings—weather-tightness, permanence, strength, attractiveness, ease of erection and habitability. Details of construction and accessories are also discussed, together with various types of Ideco buildings. The book is plentifully illustrated with sketches and photographs, including pictures of a number of hangars.

#### *Radio Telephones*

"RADIO Telephone Equipment for Private Flyers" is the title of a nineteen-page pamphlet published recently by the Western Electric Co., Inc., of 195 Broadway, New York City. One-way and two-way sets are described at length, and photographs of various apparatus are shown. Another section of the book gives information regarding airport radio equipment. Three maps of the United States that help to illustrate the catalog show established and proposed locations of radio range signal stations, established and proposed locations of weather report signal stations and the routes of various airlines equipped with Western Electric radio.

#### *Radio for Transport Lines*

IN CONTRAST with its pamphlet on radio telephone equipment for private fliers, the Western Electric Co. booklet, "Aviation Communication Equipment," emphasizes radio apparatus for air transport operations. Comprehensive information regarding the various types of equipment is given, and many photographs and diagrams add interest to the descriptions. Among the most instructive are two pictures, showing in outline typical installations of one-way and two-way radio apparatus in an airplane.

#### *Lighting Equipment Catalog*

THE PYLE-NATIONAL CO. of Chicago, Ill., has issued a catalog de-

scribing airport and aircraft lighting equipment manufactured by the company. Interesting features of the booklet are the photographs, some of which are colored, and the section headings, which give short explanations concerning the qualities and uses of the general types of equipment later listed in detail.

#### *Lathe Book 30th Edition*

ILLUSTRATED with many step-ups of lathe jobs to interest the aviation engineer and mechanic, the thirtieth edition of "How to Run a Lathe" was recently published by South Bend Lathe Works of South Bend, Indiana. The book is a manual on machine shop work in general and emphasizes the care and operation of a modern screw-cutting lathe. Among the new pages added is a section on "Blueprints for the Shop."

Originally published in 1907 as a small instruction bulletin, the book now contains 160 pages devoted to all kinds of lathe work, from installation charts to highly complicated manufacturing operations which can be performed with a lathe. More than 300 photos and drawings are used to illustrate the 400 different types of jobs described. Some of the new pages in this edition include information on motorized service shops, hints on grinding lathe tools, information on the use of small lathes and explanations of various motor drives for lathe equipment.

#### *Airport and Airway Lighting*

"FLYING BEYOND the Twilight Zone" is the title of a booklet on airport and airway lighting, prepared by R. W. Cost of the commercial engineering department of the Westinghouse Lamp Co., Bloomfield, New Jersey. A feature of the pamphlet is a two-page diagram of an A1A landing field, showing the various types of lighting equipment recommended by the Aeronautics Branch, Department of Commerce and their positions on the field. Other sections deal with statistics on modern air travel, the importance of airports, a description of how the Government lights the airways, requirements for airport ratings and illustrations and descriptions of various types of lighting equipment.

#### *Birmingham School Booklet*

TRAINING at the school conducted by the Birmingham Flying Service at Birmingham, Ala., is described in a folder published by the company. Details of four courses at the school are given with descriptions of equipment and a history of the organization. The booklet is illustrated with photographs of Birmingham Municipal Airport, where the school is located; personnel of the organization and students, and two pages of pictures of various types of airplanes used for instruction purposes.



# Own "BOTH PLANES"

**H**AVE at your service the right type of plane to fly where you wish without sacrificing speed, load, performance or safety—the finest of land planes—a tremendously useful seaplane. Switch back and forth from wheels to Edo Floats for the highest efficiency of either type and own "both planes" for but little more than the cost of one.

Operators of Edo seaplanes are enthusiastic over the economy and increased business they have discovered in water flying.

Sportsmen write that Edo performance and versatility

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brings them more pleasure than they imagined possible. Now, with summer just ahead, is the time to make actual your plans for greater profits, greater flight pleasure.

Edo Floats are stocked in 11 standard sizes. They can be fitted to over 40 popular types of land planes in the United States and Canada without change of license status. Write today for full details and new low prices. Your individual needs will have individual attention. Address, EDO Aircraft Corporation, 610 Second Street, College Point, Long Island, N. Y.



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**FLYING EQUIPMENT LEFT OVER FROM THE FORMER  
FOKKER AIRCRAFT CORPORATION OF AMERICA**

### Real Bargains While They Last

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| 1 Fokker Universal, J6-300 . . . . . NEW               | 1 Fokker Super Universal, Wasp "B" . . . . . USED      |
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HIGH GRADE AIRPLANES AT RIDICULOUSLY LOW PRICES**

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For additional information write to

**GENERAL AVIATION MANUFACTURING CORPORATION  
DUNDALK, MARYLAND**



## THE CARLSON "BIG CRATE"

R. E. DOWD

THE Wall Junior gasoline engine, which was described in the April issue and displayed in the AERO DIGEST booth at the Detroit Aircraft Show, has aroused tremendous interest among model builders. With such marvelous little engines now available, it would seem pretty certain that gas engine models will soon appear from experimental workshops, and perhaps the day is not far distant when a national contest will be run exclusively for gas engine models. Some even may have remote radio control.

What a treat we have for our readers in this issue as a fitting sequel to the Wall engine article! Through the kindness of Carl V. Carlson, a university student and a member of The Illinois Model Aero Club, residing at 245 North Austin Boulevard, Chicago, we are enabled to present full information about his giant biplane gasoline tractor, which has a wing span close to 11 feet. Carl calls it the "Big Crate," but we must hasten to explain that Carl has a very modest trait in his make-up and a way of mentioning his own achievements with a sort of apologetic reference. We have seen the model, studied it over carefully, and we can assure our readers it is far from being a "crate."

From a design standpoint there is much evidence of careful thought and planning. It is apparent that "crack-ups" were anticipated, for certain features were selected in view of their simplicity

and convenience from a repair standpoint. Walter L. Brock, a veteran in aeronautical circles, who collaborated with Carl on points of design, has quite evidently drawn from his long experience in directing the efforts of the youthful builder. With its sharp corners and square lines, one might be inclined to criticize the design from a refinement standpoint, but simplicity and practicability have been the designer's foremost objectives. Subsequent experience has more than justified the correctness of their theories. So let's get on to what they have done and how they did it.

### Fuselage

For convenience in curving, and also to increase strength, the longerons have been made in two sections as indicated in the drawing. In the forward section, Station 1 to Station 5, the longerons and fuselage members are  $\frac{1}{2}$  by  $\frac{1}{2}$  spruce and are laminated from two pieces. Wire bracing is carried back to Station 4, which is the station serving to attach the rear wing spars. From this point rearward the fuselage members are  $\frac{1}{4}$  by  $\frac{1}{4}$  spruce. For convenience in transporting, the fuselage has been made in two sections, which are joined by cotter pins and fittings at Station 7.

An engine plate of sheet dural termi-

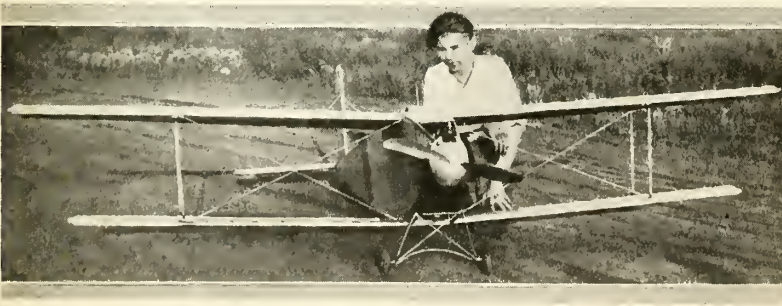
nates the fuselage at Station 1. This is provided with fittings at each corner to receive the ends of the longerons. It is provided with integral brackets to support the engine on its crankcase lugs.

The cross sections of the fuselage are rectangular throughout. From Station 1, however, fairing stringers of balsa extend back to Station 2 to preserve the form of the nose cowl. The front end of the fuselage, forward of Station 1, is covered with an aluminum cowl which is cut away for the cylinder of the engine. Such parts are difficult to make, but Carl solved the problem by using an aluminum saucepan bent to the correct shape to fit the longerons. With such a flare for the practical, we are a bit surprised that he didn't use the handle for a tail skid! At the extreme rear, the cross sections taper to a horizontal knife edge with hinges for mounting the elevator. The covering is paper throughout.

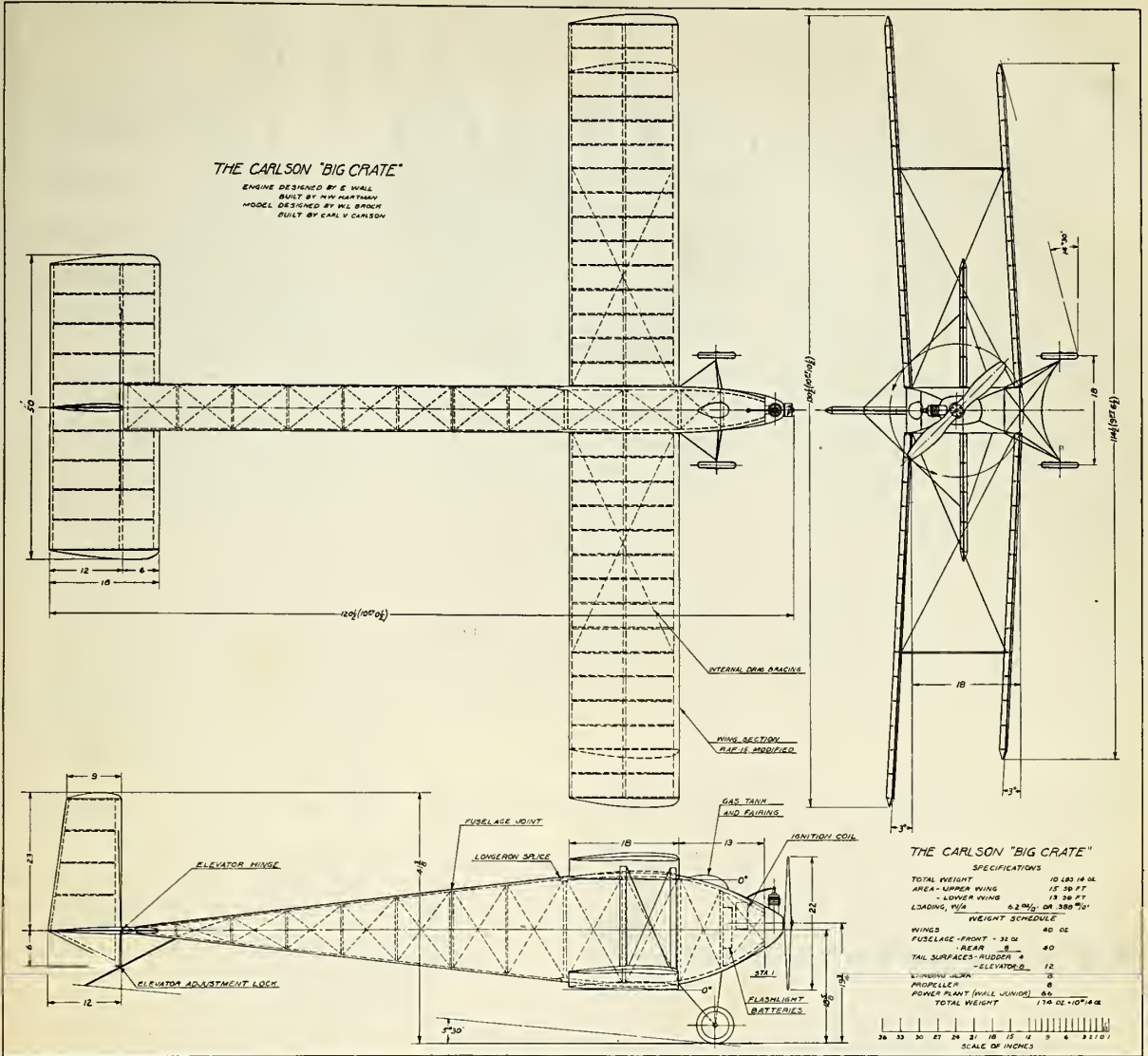
### Wing Cellule

By mounting the upper wing directly to the top longerons, the complication of an "engine section" is avoided. This makes it possible to use but four wing panels. The wing section is a modified R.A.F. 15. The principal modifications are at the nose, where the section used is quite blunt. The leading edge is formed of balsa  $1'' \times 1\frac{1}{4}''$  and serves as the front spar. The rear spar is  $\frac{3}{8}'' \times \frac{3}{4}''$  spruce. The trailing edge is spruce  $\frac{1}{4}'' \times \frac{1}{2}''$ . A rib spacing of four inches is used in both upper and lower panels. The wing tips are of balsa.

Conventional wing struts with flying, landing and incidence wires are used. Turnbuckles are provided for alignment purposes, and the standard rigging diagram calls for  $3^\circ$  dihedral angles on both upper and lower panels. While the paper covering would doubtless take care of drag loads in flight, internal drag bracing has been included, primarily to resist crash loads. No ailerons are used since ample adjustment for torque or balance is possible through the rigging wires.



Carl V. Carlson and his gasoline engine-driven model airplane



**Tail Group**

No fixed stabilizer is used as in conventional designs. As mentioned previously, the fuselage terminates in a horizontal knife edge with suitable hinges to support the main spar of the elevator. The lower part of the fin is made integral with the elevator and serves as a locking means for the adjustment by attaching to the wire tail skid.

The upper portion of the fin fits in a socket arrangement provided in the elevator. Diagonal wires serve to brace the whole assembly.

The elevator and fin cross sections are of double-cambered symmetrical form. The leading and trailing edges are of balsa shaped from 1 x 1 and 1/4 x 1/2 sections, respectively. The main spar of the elevator is spruce. All end forms are of balsa.

**Landing Gear**

At first glance the wheels seem extremely small for a model of such gigantic size, but it must be remembered that smooth runways are provided for take-offs, and the model rolls little on landing. With the all-steel wire landing gear, they have been quite adequate for all practical requirements.

**Power Plant**

The engine is the Wall Junior 1/8 to 3/8 horsepower single-cylinder, two-cycle, which was described in the April issue of AERO DIGEST. This particular engine was built by H. W. Hartman of Chicago from castings and parts furnished by The Wall Engine Laboratories of 5900 North Fairfield Avenue, Chicago. When hooked up to a 22"-diameter 12"-pitch birch propeller, it turned up 2260 r.p.m.

on the ground. At full throttle the vibration was not excessive, but could be felt by holding the hand on the structure.

The gas tank was first located in the fuselage about at the leading edge of the wing, but was later moved forward to correct for tail heaviness. The drawing shows the final location as well as the streamline balsa cover. Fuel for about 45 minutes is carried with the tank full.

Four flashlight batteries served to supply the ignition requirements when used with a coil furnished by the Wall Engine Laboratories. The coil was lashed to the front fuselage brace wires with rubber strands to take landing shocks more effectively.

While the total power plant weight was in this case four pounds, two ounces,

(Continued on following page)

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only slightly over two pounds of this total was engine weight. The coil weighed about eight ounces and the batteries about one pound. The balance covered gas tank and accessories. It was not necessary to use a special starting battery, as the regular flashlight cells proved entirely adequate for starting.

#### Performance

The "Big Crate" is a real *bona fide* flying model. The picture shows it in the air after an R.O.G. take-off from a cardboard runway. It has made many flights, most of them intentionally short by limiting the gas supply. A ground run of ten to fifteen feet usually seemed sufficient to get the model into the air. On its longest flight to date, the "Big Crate" took off and climbed rather steeply to 50 or 75 feet. It seemed slightly over-elevated and made a partial stall. The subsequent dive seemed to stretch the flying wires so that the alignment of the wing cellule was upset, for the model continued to circle with a gradual loss of height. A lone post on the improvised airport finally loomed up and caused an abrupt termination to this beautiful flight.

When she again takes the air—well, world's records had better look out!

# PAPER AERODYNAMICS

## THE "FLYING CELLULE"

**F**OLLOWING our purpose of devoting the space in the Paper Aerodynamics section to the explanation of interesting aerodynamic phenomena, we have for this article the study of stagger and decalage combined in a single cellule.

Perhaps we should first define each of these terms so that our new readers will have no difficulty in following the experiment. Taking them in the order mentioned, stagger is the arrangement of airfoils or wing surfaces one in advance of the other as well as in a different plane. It follows, therefore, that it usually refers to the biplane type. When no stagger exists, the upper surface is directly superposed over the lower. When the stagger is *positive* the upper surface is *forward* of the lower, and when it is *negative* it is rearward.

Decalage is slightly more difficult to

define, for broadly speaking, any *stable* arrangement of individually unstable surfaces must have decalage when used in combination. This either may be built in the design or may result from the deflection of air flow as it passes the forward surface. To be more specific, the canard or tail-first type usually has decalage, because the forward surface has a greater angle of attack than the rear. The conventional tractor or main-plane-first type of airplane usually has decalage because the main plane has a greater angle of attack than the stabilizer. Similarly, the tandem type usually has decalage since the same condition exists, although the front and rear surfaces may be of exactly the same size.

While the foregoing relates to decalage in its broadest sense, the usual understanding of it refers to a biplane arrangement of surfaces in which the angles of attack of the two surfaces are different. In our present article we shall deal only with decalage as found in biplanes.

The term "cellule," or more completely, "wing cellule," remains to be defined. Generally speaking, cellule refers to the entire combination of flying surfaces of a biplane, triplane, or multiplane. In such types the surfaces are usually more or less superposed and the term "cellule" has come to designate the whole assembly, including struts and rigging. Of course, a cellule is still a cellule even though it is devoid of stagger.

It is evident from the foregoing that we mean a tailless airplane when we refer to a "flying cellule," for if we were to include a tail, we should have again a conventional airplane system. This brings us to a very important distinction between the conventional tailless airplane and our flying cellule. In the former, an air load or down pressure is usually carried on some rearward part of the flying system. Swept-back wings with negative tips are most common, but in some forms the trailing edge only of the airfoil is upturned so as to make the wing section stable. In the present cellule type such is not the case as both surfaces are cambered and are unstable if used separately. Likewise, both contribute to the lift and no air load is carried at any point. A reference to the location of the center of gravity or C.G. (see diagram) will make this more evident. It

(Continued on following page)



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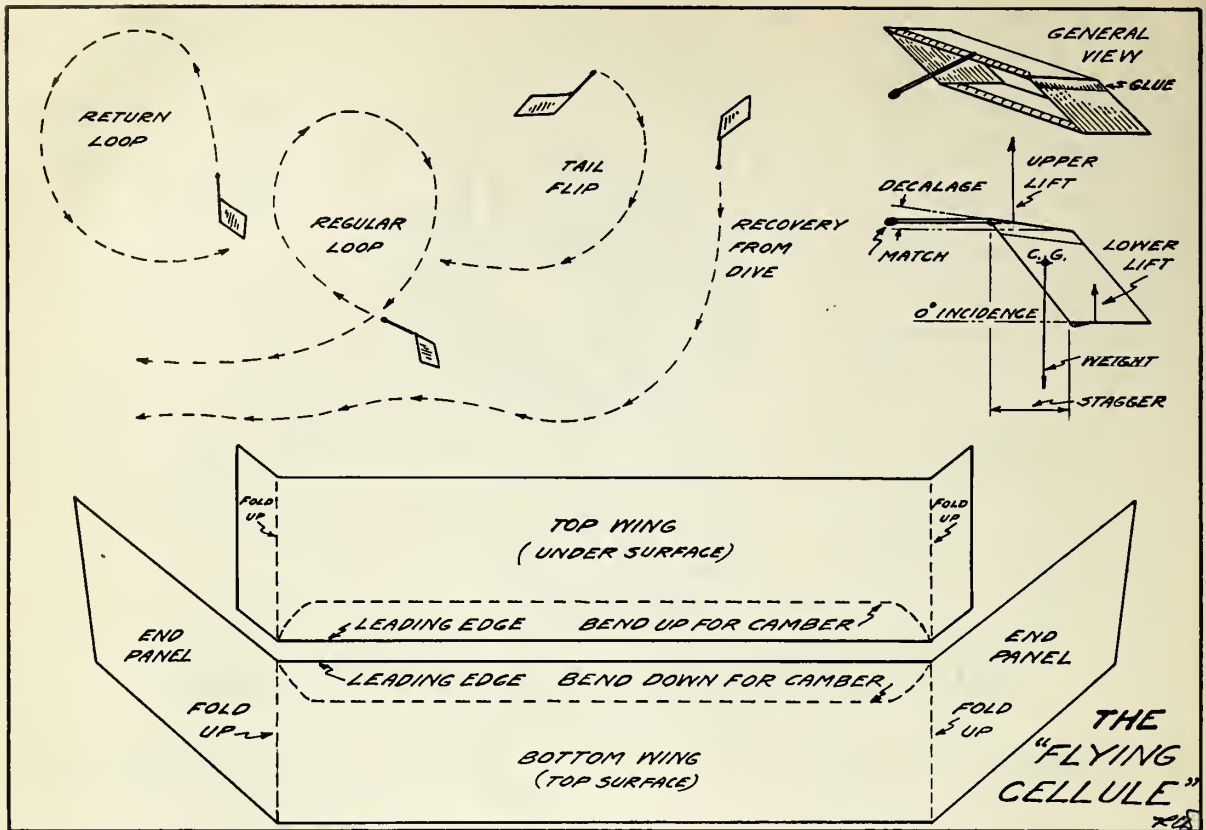
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(Continued from preceding page)

is even possible to approximate the ratio of lift of the upper and lower surfaces since it will be inversely proportional to the distances from the C.G. to the centers of pressure of both.

But here we are getting involved in the technical aspects of our creation before we have made it, so let's digress for five or ten minutes and build this most interesting little paper glider. All we need is some good grade paper like typewriter bond, some glue, a match and a pair of scissors.

The diagram has been made actual size so that it can be used as a template by pricking holes at the intersection points with a pin point. After this is done, the parts are cut out, bent as indicated, and glued together. The wood match (the imported kind, furnished in small wood boxes) is split with a razor blade about  $\frac{1}{4}$ " back from the plain end. It is then slipped in place on the leading edge of the upper wing exactly in the center. The model is now trued up carefully by sighting across the surfaces and then it is ready for flight.

Most likely the first flights will disclose a tendency to turn to the right or left. This is a sure indication that something is out of line, and a reinspection will reveal the trouble. The fore-and-aft balance should be about correct when

using a match as specified, but if the model dives, it is obviously nose heavy, and if it glides down in a series of undulations, it is tail heavy. The ballast must be accordingly changed by adding weight to the match, such as candle wax or glue, or by removing weight by cutting off a portion of the match.

When the cellule is finally balanced and adjusted correctly, it will have a gliding angle of from one in four to one in five. The center of gravity will then be found to be about as indicated on the sketch. A bent piece of wire will enable it to be located exactly as shown. As soon as we have the C.G. located, we can determine approximately the portion of the weight which is carried by each surface as mentioned previously. It will work out to be about two to one. In other words, the upper surface carries twice as much as the lower.

Briefly stated, the stability of any combination of surfaces depends on whether the resultant center of pressure of all the surfaces moves in such a manner that a corrective force is brought into play to restore balance. These resultant forces for different angles of incidence are usually referred to as vectors. This is the underlying principle, but perhaps it can be more clearly visualized by pointing out that in nosing up the forward surface will stall first because of its

greater angle of attack and this will consequently allow the nose to descend. Conversely, in nosing down, the rear surface will lose its lift first, allowing the nose to ascend. So much for the stability.

Let us now turn to some stunts which the flying cellule can do easily. The instructions for each stunt are as follows:

**Regular Loop**—Hold model right side up, by gripping match, and launch upward at about  $45^\circ$ . The cellule will climb, loop and glide away.

**Return Loop**—Hold match vertically, and with the bottom of the model towards the operator, launch straight up. The model will climb and loop, returning to the operator.

**Return Circle**—Holding the match, launch straight ahead about level but banked sharply. The model will circle and return to the operator.

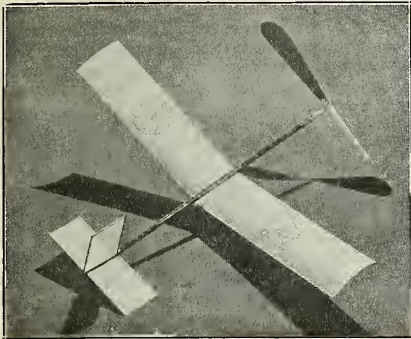
**Recovery from Dive**—Hold model vertically down with bottom surface toward the operator and release. The recovery will be prompt, and each subsequent oscillation will be smaller, indicating satisfactory damping.

**Tail Flip**—Hold model inverted, but slightly inclined upwards, with the match pointing towards the operator. Release, and the model will quickly flip over and glide gracefully without appreciable oscillation.



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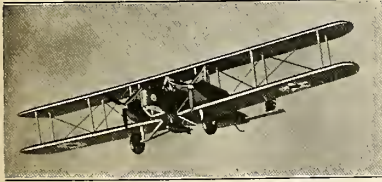
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# MODELS

## THE DEMOISELLE CONVERTIBLE

WITH the coming of spring, model builders naturally begin to consider hydro designs, which can be launched from small ponds or lakes. Primarily for this reason, we have selected the Watkins "Demoiselle" for our May issue. This model, which was designed and built by Frederick Watkins of Forest City, Long Island, N. Y., is not only a hydro but is also instantly convertible to a landplane. This feature doubles the utility of the model and enables the experimenter to conduct interesting flight tests, both with and without pontoons.

Perhaps we should explain where the unusual model gets its name before proceeding with the description. Those who study entomology would have no trouble tracing the origin of the name, for damsel flies, called "demoiselles" by the

French, are a common species of insect usually found daintily fitting over small ponds and lakes. They resemble dragon flies except that they do not fly so fast. There is another difference noticeable, for when they alight they fold their wings instead of leaving them outstretched like the dragon fly. So we have the name Demoiselle, because the model flies daintily and slowly, and it is designed to fly over ponds and small lakes in fairly calm weather.

### General Description

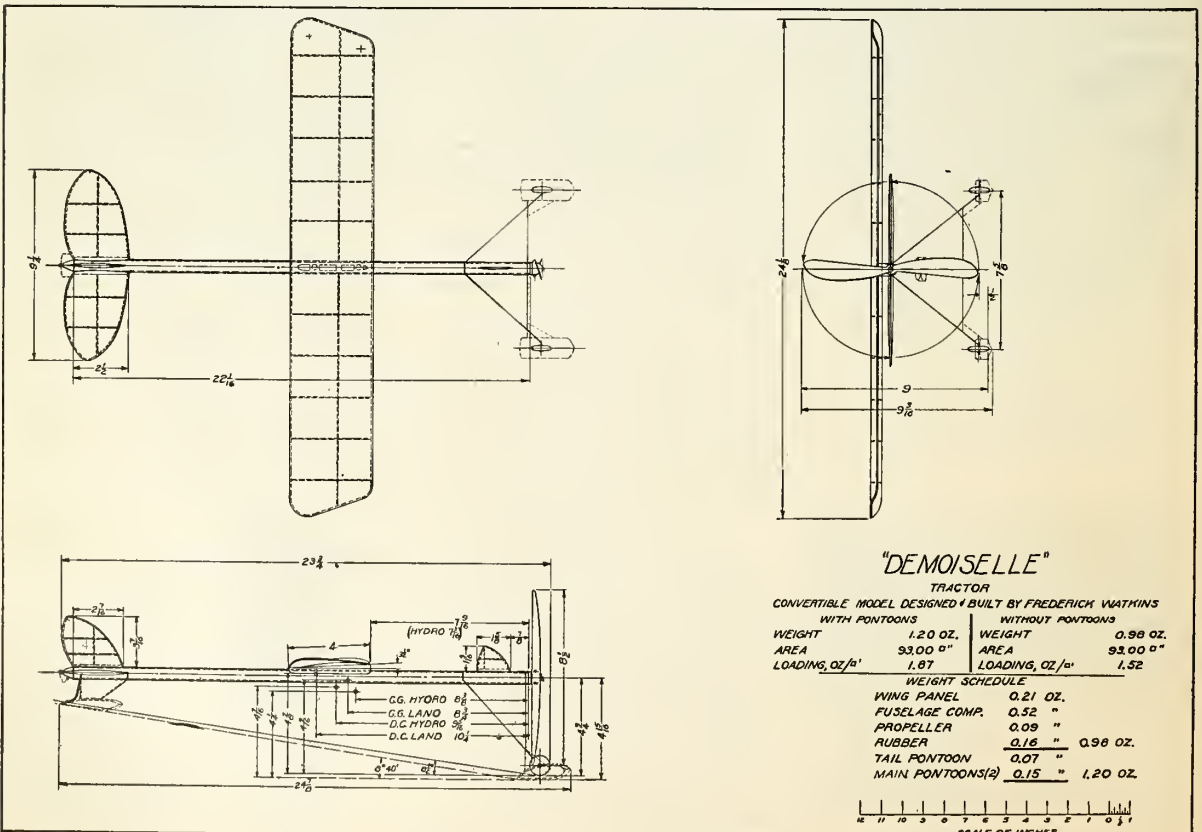
Briefly, the Demoiselle is a tractor monoplane with a rubber motor operating inside a tubular wooden fuselage. Its surfaces are double covered throughout. Two vertical fins are provided above the center of gravity. The landing gear is made of wire with celluloid wheels,

which fit into recesses in the pontoons of the convertible gear. It will take off from water or land almost instantly.

### Fuselage and Tail

The tubular fuselage is made from a sheet of basswood about .020 thick. Balsa, of course, could be used instead and would be much lighter. It is formed, after soaking in hot water, around a 1/2" diameter paraffine-coated dowel. The lap seam is cemented after drying and the finished tube is given a coat of thin shellac for waterproofing. At the front end a small balsa plug is inserted and cemented. This plug has a 1/4" diameter hole through its center to receive the shank of the propeller bearing plug, which is also of balsa. A flange on this nose plug equal to the outside diameter of the tube is provided to take the tension of the rubber motor. A brass tube passing through the plug furnishes a bearing for the propeller shaft.

At the rear end a similar construction is provided, except that the streamline tail plug, which is used as an anchorage for the rubber motor, has three small keys made from pieces of toothpicks cemented to the shank. These fit into corresponding keyways of the reinforcing plug and prevent the rubber motor from



turning the anchorage system. The hook is fashioned to include the tail skid, and in winding, the whole tail plug assembly is pulled out by the winder.

Attached to the fuselage forward of the wing is a small fin. This is made of balsa with a bamboo outline. Exactly the same construction is used at the rear where the two-piece stabilizer is cemented to the fuselage by simply butting the balsa rib against the tube. The rear fin is similarly made and attached. Double cambered surfaces are used throughout and Japanese tissue is used for a covering. On account of the delicate framework the tissue is first "doped" with banana oil on a window pane. It is then peeled off and applied to the various surfaces without further doping.

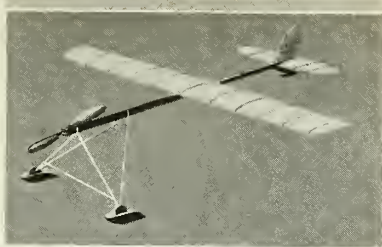
**Wing**

A single basswood spar about 1/32" thick is used as shown on the drawing. The outline is bamboo throughout. The ribs are also cut from 1/32" basswood to the U.S.A. 5 section. After cutting the outline, the inside is cut away, leaving only a 1/16"-wide outline of the original rib. To stiffen this outline, two small pieces of toothpicks are cemented as struts inside the outline at points about one-third and two-thirds from the leading edge. The spar is made just deep enough to fill the space inside the rib outline.

At the center two dress snaps are mounted on a main rib 5/8" wide. These in turn snap over the corresponding parts of the snaps, which are mounted on the balsa bolster, this being grooved to fit on the fuselage tube. The bolster is cut so that the wing mounts at an angle of incidence of 3 1/2°. Both balsa parts are cut out for lightening. The use of dress snaps enables the wing to be mounted in exactly the same place each time and permits easy removability for carrying.

**Landing Gear**

Music wire of .020 diameter is used for the landing gear. Two celluloid wheels, 1" in diameter, of streamline



The Demoiselle Convertible

form, are mounted on stub axles bent from the wire struts. The cross brace of the gear can be detached on one end, which permits the two Vees to fold flat for transporting.

**Pontoons**

Both the main and the tail pontoons are carved from balsa. The front pontoons are 2 9/16" long by 1" wide by 3/4" thick. The tail pontoon is 3 3/4" long by 1 1/4" wide by 9/16" thick. A Vee bottom is used on all pontoons to reduce take-off suction. They are completely finished on the outside first and then split in halves and hollowed out to a shell. They are then reassembled, using balsa dowels passing through the shells laterally. For a final operation an opening is cut in the top of each of the main pontoons to the exact shape of the wheel. A half of a wheel is then cemented in this opening to form a sort of pocket to receive the wheels of the landing gear. After shellacking, this makes a watertight unit of excellent shape and extremely light weight. Small wire clips passing through the dowels are used to attach each assembly to the corresponding wire struts. The tail pontoon is attached by two wire clips which pass through vertical dowels on the pontoon.

**Propeller and Rubber Motor**

The propeller is carved from white pine. The diameter is 8 1/2" and the pitch is approximately 10". The maximum width of the blank is 7/8" and the thickness at the hub is 7/16". This reduces

towards the tips quite appreciably.

A simple "free wheeling" or swivel is provided at the hub so that the propeller can turn freely during the glide when the power is exhausted.

Two strands of 1/8 flat rubber are used.

**Performance**

The weight of this model runs slightly heavy because of the rather extensive use of basswood. It is, however, a beautifully consistent flyer and will average about one-minute duration.

**SCALE MODEL ACCESSORIES FOR FLYING OR NON-FLYING MODELS**

- Aluminum Anti-Drag Ring (Split).....25c. Postage 5c
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- 1 1/2"   ..... 30   ..... 20   ..... 25
- 2"       ..... 35   ..... 35   ..... 30
- 2 1/2"   ..... 40   ..... 40   ..... 35
- 3"       ..... 50   ..... 50   ..... 45
- 3 1/2"   ..... 60   ..... 60   ..... 55
- 4"       ..... 65   ..... 65   ..... 60
- 10c Packing and Postage
- DIE CAST DUMMY MOTORS**
- 1 1/2" dia. 7-cyl. with prop.....\$1.00 Postage 3c
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- 3 1/2" dia. (Hawk Type) with spinner.....35c
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- 3 1/2" dia. Standard Steel type.....35c
- 6 1/2" dia. Standard Steel type.....75c
- 5" dia. 3-bladed with spinner.....75c
- Postage on any above propellers 3c each
- Standard Carved Propellers. Balance Guaranteed.
- Diameter   6"   7"   8"   9"   10"   11"   12"
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- Basswood.....36c   42c   48c   54c   60c   66c   72c
- Redcut Propeller Blanks. Standard Type.
- Basswood.....6c   7c   8c   9c   10c   11c   12c
- Balsawood.....8c   10c   12c   14c   16c   18c   20c



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# READER CONTACTS



Bamberger Aero Club prize winners

**Bamberger Aero Club Holds Third Annual Indoor Contest**

**W**ELCOME, B. A. C. Champs, to the columns of the AERO DIGEST Contacts section! We like your looks and we like those models, too. We know you'll keep those medals as treasured mementos. More power to you boys, and sincere congratulations!

Results of Indoor Contest held in the 113th Infantry Armory, March 26, 1932:

R. O. G. Junior	Time	R. O. G. Senior	Time
Casimer Ciesla	3:24	H. Greenberg	4:02
Bill Sherwood	2:49	W. Bender	4:00
B. Sheckell	2:26	F. Radoff	4:32
G. Holhrooks	1:44	B. Shadt	3:21
R. Walker	1:03		

Commercial Jr.	Commercial Sr.		
Alton Du Flon	3:23	H. Orzechowski	5:00
S. Henig	1:17	W. Bender	3:40
Ed. Mahon	:43	H. Runkel	2:52
		J. Kittel	2:25

Tractor Jr.	Tractor Sr.		
Alton Du Flon	5:32	H. Orzechowski	8:35
Anthony Liccese	3:04	H. Greenberg	8:06
C. Ciesla	2:46	J. Kittel	7:49
David Herman	1:56	F. Radoff	3:52

Autogiro Jr.	Autogiro Sr.		
Alton Du Flon	:44	E. Ward	:51
C. Ciesla	:17	Al. Gross	:35
B. Sheckell	:14	P. Shadt	:35

The following Monday the Bamberger Aero Club Contest Team entered the Eastern State Indoor Contest, conducted by the New York Evening Graphic at the 165th Armory in New York City. John Ziach, a Bamberger Aero Club member, resident of New York, won the Howard Hughes trophy and a trip to Washington. Other members also shared in the honors, placing as follows:

Place R. O. G. Junior	Place R. O. G. Senior
1—Jerome Kittel	1—H. Runkel
2—Jerome Kittel	2—F. Ziach
4—Herbert Greenberg	3—J. Ziach
5—Andrew Ruffino	4—H. Orzechowski
	5—Alan Urdang

Duration Jr.
1—Welcome Bender
2—Jerome Kittel
3—Herbert Greenberg

Commercial Jr.
2—Jerome Kittel
4—Alton Du Flon

**Jerome Kittel, B. A. C. Member, Conducts Rubber Research**

We have had some fine letters from Jerry in reference to a careful study of rubber motors. It is not quite complete

enough for publication yet, but we hope he will continue the good work.

**Kansas City Model Contest**

The winner of a miniature airplane competition at Kansas City, Mo., on June 12 will be flown to Dayton, Ohio, by Dr. John D. Brock, to represent Kansas City in the national miniature airplane contest. The event, which is to be under the auspices of the Kansas City Junior Aeronautics Club, is open to boys between the ages of 10 and 21 who live within 150 miles of Kansas City. Now, you fellows who can qualify, here's your chance to enter an interesting competition and win an air trip with Dr. Brock, a prominent sportsman pilot.

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Dinner - - - 85c	Dinner - - - \$1

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**STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS, AUGUST 24, 1912,**

of AERO DIGEST, published monthly at New York, N. Y., for April 1, 1932.

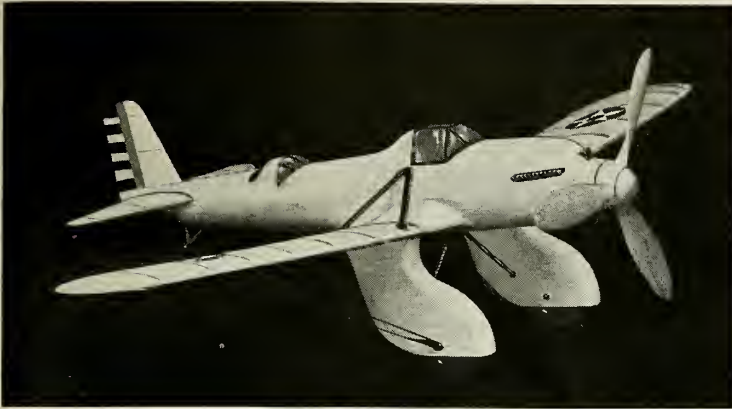
State of New York, } ss.:  
County of New York, }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Frank A. Tichenor, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the AERO DIGEST, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Aeronautical Digest Publishing Corp., 220 West 42nd St., New York, N. Y.; Editor, George F. McLaughlin, 220 West 42nd St., New York, N. Y.; Managing Editor, None; Business Manager, Frank A. Tichenor, 220 West 42nd St., New York, N. Y.
2. That the owners are: The Aeronautical Digest Publishing Corp., 220 West 42nd St., New York, N. Y.; Frank A. Tichenor, 220 West 42nd St., New York, N. Y.; Jessie H. Tichenor, 220 West 42nd St., New York, N. Y.
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

(Signed) FRANK A. TICHENOR.

Sworn to and subscribed before me this 19th day of March, 1932.  
(Signed) ANNA HIGGINS,  
Notary Public, New York County Clerk's No. 310.  
Queens County Clerk's No. 216.  
(My Commission expires March 30, 1932.)



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Each kit contains full size plans, with complete instruction chart on how to build and fly these wonderful models. Every kit contains ready made prop, celluloid wheels, bottle of cement, clear dope, 2 bottles of (different) colored dopes, tissue, rubber, insignias, and surplus balsa strips cut to size. Materials are the finest; and include stamped ribs, formed wire parts, ALUMINUM COWLING (in kits 2-3-4) radiator for No. 5 with directions for assembling veneer cowling for No. 1.  
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# FOREIGN NEWS IN BRIEF

Compiled from correspondents' reports and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

## Germany Sponsors International Tour for Reliability

THE International Reliability Tour for 1932 will be held under the auspices of the German Flying Club August 21-27. Prizes for the race include a silver cup and cash awards ranging from \$3,920 to \$274. The cup will be held permanently by the club whose representatives have won it three times. The club holding the cup is to organize the next competition.

The 5,196-mile route to be followed by contestants passes through Germany, Czechoslovakia, Austria, Italy, France and The Netherlands, starting at the Berlin-Tempelhof airport and ending at Berlin-Staaken airport. The entire trip is divided into three principal sections, each to be covered in two days, and includes twenty-six compulsory landings. Allowance is made for one day of rest. On the last lap of the tour points will be awarded for maximum speed. The day after the close of the contest, the competitors will race over a triangular 185-mile course from the Berlin-Staaken airport to the Berlin-Tempelhof airport.

Participation in the tour will be limited to two classes of light sport planes accommodating two or more persons, those with empty weight under 618 pounds and those with empty weight under 881 pounds. Technical tests will be started about August 11 at Berlin-Staaken airport. Inherent characteristics of the plane will be considered.

Among the participants in the tour will be representatives of clubs in Germany, France, Italy, Poland, Switzerland and Czechoslovakia.

## Flight From England to Cape Town

FLYING 6,300 miles from England to Cape Town, South Africa, in approximately four days and 17½ hours, J. A. Mollison surpassed the previous record for the journey by fifteen hours and nearly halved the time of the fastest solo flier, by his flight March 24-28. Last year he broke the speed records for flights from Australia to England. His schedule for the Cape Town flight was to cover the distance in four days and three hours, but the additional time taken was caused by rest periods and adverse winds south of the equator.

Mollison's airplane, a De Havilland *Puss Moth* monoplane, powered with a

single 120-horsepower *Gipsy III* engine, gave no trouble, he reported. The plane was built originally more than a year ago for an attempt at a non-stop flight across the South Atlantic Ocean. The ship carries nothing but bare essentials; the furniture is stripped from the cabin, and every possible ounce of superfluous load is eliminated. Two special tanks in the after part of the fuselage carry a total of 120 gallons of fuel, sufficient to maintain the machine in non-stop flight for nearly twenty-two hours. Luminous instruments, including a turn indicator for blind flying, and night navigation lights guide the pilot, and extra oil is carried in a supplementary reservoir. In every other detail the machine is exactly the same as the standard *Puss Moth* monoplanes used by many private airplane owners.

In flying along the West Coast of Africa, Mollison may be the forerunner of regular commercial vehicles which will ply between Europe and Cape Town by way of the West African states. The route is 800 miles shorter than that followed by the British airliners through Egypt, East Africa and the Rhodesias, and has the further advantage that airdromes can be established at low heights along the route, one of the chief difficulties in operating the easterly airline being that many of the landing grounds are located more than 5,000 feet above sea level, limiting the loads that commercial planes can carry and introducing serious problems of landing and take-off.

## AUSTRALIA

AT twenty points in the district of Cloncurry, Queensland, the aerial medical service of the Australian Inland Mission has provided the only means of communication with civilization. The Mission has developed a series of wireless posts, providing links with a mother station at Cloncurry, and so simple are the sets that all the operators have to do is learn the Morse Code. While some of the stations have their own landing grounds, others in calling for help have to describe a possible landing ground to the pilot.

THE engineering firm of Harkness and Hillier of Sydney built an experimental four-cylinder, water-cooled engine suitable for light planes. The engine, which was designed by D. Harkness, proved successful, but the high cost of production prevented it from competing with imported engines.

THE recently acquired eight-seater D. H. 61 plane obtained by W. A. Airways, Ltd., from England was put through its flying tests after assembly at Maylands airdrome and has taken its place in the regular schedule of machines for the Northwest. The plane was necessary to meet the growing demand for accommodations on the popular Northwest service, where aerial traveling is as cheap as transport by any other means.

## AUSTRIA

IN spite of the shortening of the flying season, increased air traffic in Austria was reported during 1931. Passenger rates on long flights were reduced, making them equivalent to second-class railroad fares. The Vienna-Berlin express service was extended to Budapest. The subsidy received from the Government totaled about \$435,756.

Austria has five authorized airports, seventy-two licensed pilots and fifty-four registered airplanes.

## CANADA

PROPOSALS that the Dominion government use its reduced appropriations for aviation to build up a reserve air force in the flying clubs are being considered. This would make Royal Canadian Air Force aircraft and instructors, now idle, available for advanced training of club members at a considerable saving over regular Royal Canadian Air Force operations.

A RECORD run of fifty-five minutes from Wayne County airport, Detroit, to Hamilton, Ont., airport was recently made by E. C. Burton of Canadian Airways, Eastern Lines. The trip was made in a Stearman Speedmail, the average speed being 218 miles per hour.

A REGULAR passenger and express service connecting Toronto, Rochester and New York will be inaugurated by Dunn's International Air Ferry, Inc., early in May. Schedules are for a morning and evening run each way daily, flying time being 3½ hours. This will allow a return trip to be made from either end of the line in a day, with six hours available for business at the opposite end. Sikorsky amphibians will be used on the Toronto-Rochester division. The northern terminal will be Toronto Air Harbour, which is ten minutes' walk from the heart of the city. Glenn Curtiss Airport or Newark airport will be used at New York.

(Continued on following page)

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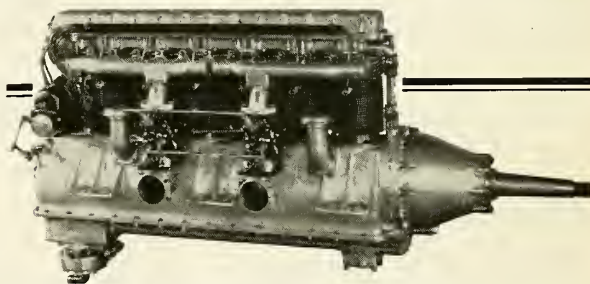
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| Propeller Hubs | Safety Filler   |  |
| Engine Stands  | Caps            | Special Tools, etc.                        |

(Continued from preceding page)

**BEGINNING** April 1, planes on the Winnipeg-Chicago air mail service have left Winnipeg daily at 2:00 p. m., arriving at Chicago at 11:15 p. m. The planes fly via Pembia and St. Paul.

A FIVE- or six-week air tour of British Columbia, in which ten or twelve planes will participate, is planned for July and August under the sponsorship of the British Columbian Flying Club. The purpose of the tour is to encourage the provision of airports and to increase interest in aeronautics. At least twelve cities along the route of the trans-Canadian air mail will be visited.

THE Russell Manufacturing Co. of Middletown, Conn., makers of Rusco brake linings and other automotive products, reports that its Aero Safety Belts have been adopted by the Department of National Defense for the use of Canadian aviators.

## DENMARK

DIRECT service between Copenhagen and Berlin, Germany, is scheduled to begin May 1 on the Danish Air Transportation Co. line. Service has already been started between Copenhagen and Hamburg, the trip taking two hours, and an express service between Copenhagen and London and Paris also has been instituted. A local service to these two cities is planned to begin from Copenhagen May 1.

## ENGLAND

IMPERIAL Airways resumed last month its regular summer season of tea flights over London. On each Friday and Sunday afternoon, one of the four-engined thirty-eight-passenger airliners, taking off from the London airport at 3:45 p. m., flies over London, giving its passengers a bird's-eye view of the city. While the plane is flying above the city, the air stewards serve tea from their buffets. The cost of one of the flights includes automobile transportation to and from the airway terminus at Victoria, as

well as a conducted inspection of the airport.

THE port of Limasol on the island of Cyprus has become a weekly stop on the Imperial Airways' England-India service. Passengers who leave Basra or Baghdad on Friday will reach Cyprus before mid-day on Saturday, and, after spending a week-end on the island, will be able to catch a return plane on Tuesday, arriving at Baghdad or Basra on Wednesday afternoon.

A NOVEL air race has been organized by the London Morning Post to take place over a course of 500 miles on May 21. The regulations are formed to make the race as much a test of skill in the use of maps and compasses as of engines and airplanes.

Every competitor will start from Heston Airport, near London, with sealed orders. He will be handed a section of the air map of Great Britain, scaled ten miles to an inch, with points marked on it that he must fly over on his way to the first control. The order of visiting them will be indicated on a slip attached to the latest weather report. He must plot his own course and after halting a stipulated length of time at each control, will be given a further list of places to visit on the next "leg" of the race. Pilots with less than 250 hours of solo flying on their log-books will be allotted time allowances of varying lengths.

FOURTEEN airplanes constitute the fleet of the international air university at Hamble, Southampton, which was opened ten months ago by Air Service Training, Ltd. They comprise four *Atlas* two-seater biplanes similar to the craft used in the Royal Air Force for Army cooperation work, a *Siskin* fighter, three De Havilland two-seater planes, two Avro *Tutor* service training machines and four *Avian* light planes. Instruction is given in flying both landplanes and seaplanes.

THE future of the flying club movement in Great Britain is assured on a

firmer basis by the decision of the Air Ministry to make certain changes in the methods employed in calculating the grants payable to twenty-three clubs. Under the present agreement, which terminates in July, these clubs are paid ten pounds for each pupil who is trained to qualify for the pilot's "A" license and receive a fee for every renewed license credited to a club member, the maximum to be paid in any one year to a single club being 2,000 pounds. The new basis will allow for a larger grant for every "A" licensee, and certain other adjustments.

THE first of twenty-six machines ordered for the equipment of the Spanish naval air service, a Vickers *Vildebeest* torpedo plane flew recently from Brooklands airdrome, England, to Madrid. The remainder of the craft included in the contract will be built under licenses in a Spanish aircraft factory which is located at Cadiz.

SIX new type training airplanes are being added to the equipment of the Irish Free State Army Air Corps. The first three have already flown in formation across the Irish Sea to Baldonnel airdrome, near Dublin. The airplanes belong to the new Avro *Cadet* series and are manufactured by A. V. Roe & Co., Ltd.

LANDPLANES and flying boats of the Royal Air Force are engaged on the survey and development of an air route along the shores of Arabia between Basra, located in Iraq at the junction of the Euphrates and Tigris rivers, and Aden, the British station at the entrance to the Red Sea, nearly 3,000 miles away. Landing fields have been approved at Khor Jaramah, Ras el Hadd, Masira Island, Mirbat, Salalah and Mukalla.

Not only does the new route possess obvious strategical advantages, but the route would open a new way between Asia and Eastern Africa and the Sudan, along which flying boats would travel from India across the mouth of the Persian Gulf and then along the South Coast of Arabia to Aden.



Prince Bibesco's flying yacht, a Junkers Ju-52 trimotor



THE fastest machine ever entered for the King's Cup race in July, a high-speed mailplane capable of 175 miles an hour; service type training planes, twin-engined craft built for private owners, a fast and powerful air transport monoplane and several new type small planes are included in the first list of entries for the race issued by the Royal Aero Club recently.

Every airplane entered will be handicapped on the assumption that it can average at least 110 miles an hour over the course of 1,250 miles. Among the entries are six women.

SPECIALLY conducted parties of air tourists, accompanied by couriers who will point out to them the landmarks below, this summer for the first time will take off from London and fly to various places in continental Europe in the airliners of Imperial Airways.

A LONG-DISTANCE autogiro flight between England and Tanganyika Territory is being planned, it is reported. The autogiro will be powered with a 100-horsepower Armstrong Siddeley *Genet Major* engine. The route of the flight will be along the North African coast and the Nile River.

## FRANCE

CIVIL aviation will be under the direction of the Ministry of Public Works, since the disorganization of the Ministry of Air. Military aviation will be controlled by the Ministry of National Defense, which combines the Ministries of Air, War and Navy.

WEEKDAY passenger service between Paris and Cannes has been inaugurated by the Air Union. The trip, which takes five hours, is made in Breguet seven-passenger planes, equipped to carry freight.

## GREECE

THE first international aeronautical exhibition in Greece was held at the Zappion Palace, Athens, last month. The exhibition was designed primarily for the education of the Greek public, and emphasis was placed upon the instructive phases of the displays. Full size military aircraft were banned, and even in commercial airplanes, preference was given to models, pictures and diagrams.

One of the features of the exhibition was the British section, in which models and pictures showed the history of aeronautical accomplishments from the designs conceived in the first part of the nineteenth century to the most modern military and commercial airplanes.

ELEVEN Greek airports were recently made customs airports. Foreign

planes entering the country are required to land at one of these ports which are at Nea Pergamos, Old Phaleron, Tatoi, Sedes, Phaeakion, Patras, Syra, Loutra-kion, Spinalonga, Candia and Jannina.

DAILY air mail, passenger and express service between Paris, France, and Thessaloniki was started last month by the International Air Navigation Co.

## INDIA

SEVEN Indian flying Clubs were approved to receive Government assistance totaling approximately \$335,660 recently. Special amounts of \$620 were granted to the Delhi and Bombay flying clubs for airport administration at New Delhi and Juhu. For the maintenance of the airport personnel in the civil aviation department, the sum of \$3,176 was approved.

## MEXICO

A CONCESSION from the Ministry of Communications and Public Works to establish an aviation service that will connect San Diego, Calif., with Vera Cruz has been solicited by Gen. Manuel J. Celis. This concession proposes a route extending from Vera Cruz to Mexicali, Lower California, with the plan of extending it later to San Diego. Passengers, mail and express would be carried, and stops would be made at Mexico City, Morelia, Guadalajara, Nayarit, Mazatlan, Los Mochis, Guaymas and Hermosillo. It is reported that service would be three times weekly at the start and later daily, if business should justify such operation.

AS A MEANS of augmenting the regular vigilance service which protects forested regions from fires, War Minister Plutarco Elias Calles has ordered the commanders of military operations in Guadalajara, Torreón, Monterey and other central points to employ their air forces in patrolling timberlands.

PLANES of tourists who visit Mexico without obtaining permits to do so, and those of smugglers, are liable to confiscation, warns the Ministry of Communications and Public Works. This action results from many Americans making private air trips to Mexico without first securing sanction to do so from Mexican consuls.

A MODERN landing field, 800 by 200 meters, fully illuminated for night flying, has been established at Zihuatanejo, a Pacific Coast port in Guerrero. The field was conditioned by the townspeople, who donated their services.

ALL aviators who carry passengers without having licenses to do so will be heavily fined for first offenses and both fined and imprisoned for subsequent violations, according to the Mexican Ministry of Communications and Public Works.

A NEW airline will be in operation this summer between Mexico City and El Paso. It will be operated by an American organization and will use the same route as that used by the C.A.T. Lines before their suspension. Daily two-day, nine-hour service will be offered on the line, using trimotor planes. Improvements are planned for various landing fields along the route.

## SOUTH AMERICA

A NATIONAL Aeronautical Council for the promotion of aeronautics is being organized in Brazil. The Ministries of Transportation and Public Works, War and Marine, as well as every state in the country, will each have a representative member in the council who will be appointed for five-year terms. The organization will meet at least once monthly under the presidency of the Minister of Transportation and Public Works. Resolutions passed are subject to the veto of the President of Brazil.

ACCORDING to an arrangement between Scadta and the Colombian government, the latter is now in control of Colombian air mails. Although continuing in active management of operations, the company will pay the government two per cent of the proceeds from the sale of national stamps required on all mail transported.

## GERMANY

THE Deutsche Luft Hansa spring schedule operates eighteen services, with a daily mileage of about 8,700, connecting twenty-three German and thirteen foreign business centers. The Hamburg-Frankfort-on-Main-Stuttgart service has been extended to Zurich. The company reported an increase in passenger traffic for 1931 over that for 1930. Freight traffic also gained.

THE Hindenburg Prize for the Furthurance of Motorless Flying for 1931, consisting of a silver cup and a cash gift, was awarded to a Frankford-on-Main pilot for sailplane flights he has made during the past year, one of which was from Munich to Kaaden, a distance of 170 miles.

## ITALY

THE sail flight school, instituted by the Pensuti Aero Club of Milan, has begun its instruction courses. A sail flight group has been started at Pescara.



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## MORE AIRCRAFT CARRIERS NEEDED

(Continued from page 23)

groups of the world who refuse to see how important a modern aircraft carrier is, our own Congress stands alone!

The value of aircraft carriers does not depend upon their size, as is the case with other war vessels.

Only one airplane can take off or land upon a carrier's deck at one time, so that the speed of getting the airplanes into the air depends directly upon the number of landing decks. There is also a great advantage in mobility, that is to say, in having numbers of landing fields available in different places at the same time. Here is an important fact which must not be overlooked when we go to work on the problem of demanding that our aircraft carrier strength be increased.

The aircraft carrier, a sort of floating nest for winged guns, is a craft of comparatively recent development, and we are only just beginning to realize how valuable these ships can be. At the time of the Washington Naval Conference so little was known regarding their usefulness that it was believed that 135,000 tons of these ships would be all that any nation would need or would ever build. The tremendous potency of the modern airplane has since shown how wrong that estimate was.

Today we know that aircraft carriers are needed by our fleet for:

Off-shore patrol against raids on the Panama Canal, the base in the Hawaiian Islands and other important vulnerable positions.

Patrol of the Caribbean area against establishment of enemy forces.

Patrol of trade routes and escort of convoys.

Operation against enemy trade and lines of communication.

Seizure of advanced bases.

Operation with the battle fleet in any theater of war for protection, for scouting, patrol, reservicing of cruiser and battleship planes and for attacking enemy vessels, aircraft and bases.

In addition to all these, an aircraft carrier is an invaluable weapon for bringing action against a weaker but faster fleet.

When our battle fleet, supported by scouting force, put to sea upon the Pacific to repel an imagined invading horde, the United States had only two sea-landing fields from which to operate her aircraft afloat. Even the most skillful maneuvering and placing of these two ships left wide areas through which enemy aircraft could pour without serious opposition. The United States has provided itself with only two of the only known craft afloat which can oppose that hostile air power which now destroys our long-famed geographic isolation.

These two vessels, the *Saratoga* and the *Lexington*, use up half of the total allowance of the United States but are less valuable than three carriers of the same total displacement. The *Ranger* (England) and the *Langley* (U. S.) use 24,500 tons; the latter being distinctly inferior to foreign experimental carriers and of little value for war. By scrapping the *Langley* we can build but three more vessels, giving us a total of six. Great Britain has one old and five modern carriers totaling 115,000 tons. Four of these are classed as experimental and may be replaced. By replacing the *Argus*, Great Britain need build but two more to have a total of seven. Japan has two modern car-

(Continued on following page)

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Elgin Temperature Gauges . . . . .	12.50	10.50
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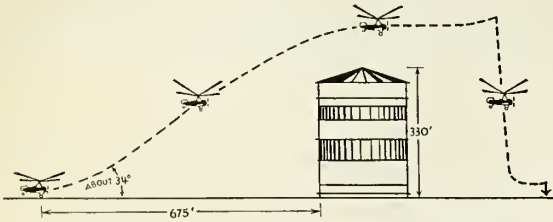
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(Continued from preceding page)

riers and an experimental one with good service qualities and is building a fourth. She need build but one more large carrier or two small ones. France may build two and Italy, three. After the completion of the present allowed building programs, the United States will have four aircraft carriers; Japan, four; Great Britain, six and France, one. But considering only vessels now building and those completed since the Washington Conference, Great Britain has five, the United States, three; Japan, four and France, one. A rather startling situation!

And if we are to discuss the problem of naval aviation intelligently there is another, a new type of vessel, which it is well to know something about. This new vessel is known as a flying-deck cruiser. The Navy Department has plans for vessels of this type, and it is greatly to be hoped that the American people will show enough interest in this new craft so that authorization may be obtained to begin their immediate construction.

The present conception of the flying-deck cruiser is that it will operate about twenty-four planes and will be armed with six-inch guns. It will have a speed of about thirty knots and will displace 10,000 tons. One of the chief advantages to be gained in building these craft is that they are to be counted in our cruiser tonnage and not in the carrier tonnage. Very few people know this—but that rather remarkable fact of allowing flying deck tonnage to be listed in cruiser tonnage, *not carrier tonnage*, represents the one outstanding victory which America enjoyed in the London Naval Conference, and as yet Congress has failed to take advantage of the victory which we achieved there. For, by this fact, I say it is possible for us to overcome the existing disadvantages which our political leaders obtained for us in the carrier category.

Our present deficiency in aircraft carriers and the unwillingness of Congress to improve the eyesight of our Navy by sanctioning construction of the new flying-deck cruisers should be a matter of grave concern to all those who have the safety and welfare of the nation at heart.

## AIRWAYS OF JAPAN

(Continued from page 25)

### Plan Future Routes

Preparations have been made for two important airways, one of which starts from Fukuoka in Kyushu and extends to Shanghai, China, covering about 700 kilometers. The other is an airway of about 1,600 kilometers which starts from Fukuoka and extends to Taihoku in Formosa. These two airways are branches of the main line of the Japan Air Transport Co., Ltd., between Tokio and Dairen, flying long over-water routes. Several test flights had been accomplished, and it was decided to open the airlines, but the project of the airway to Shanghai had to be abandoned temporarily because of the Manchurian and Shanghai conflicts. However, it is expected that the commercial airway to Formosa, the most southern territory of Japan, will be opened shortly.

The most important airway for Japan will be a long-distance commercial line from Dairen, the terminal airport of the main airway of Japan at present, along the South Manchurian Railway to Tsitsihar, flying over Mukden, Chungchung and Harbin. A triangular airway will be formed by a branch running from Keijo in Korea to Mukden. The airway in Manchuria was planned years

(Continued on following page)

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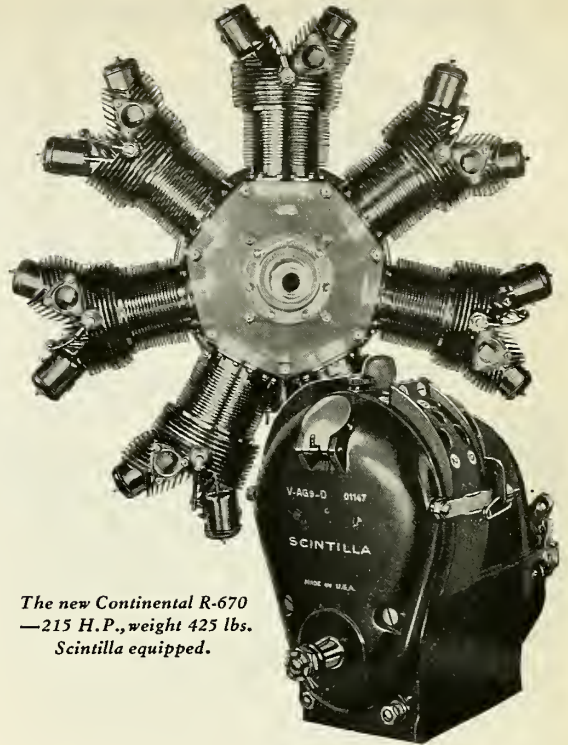
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(Continued from preceding page)

ago, but the Manchurian conflict hastened its materialization.

The development of an airway north of Tokio yet remains to be accomplished. It is necessary that such an airway connect Sendai, Aomori, Hokkaido and Karafuto. If this is realized, the small village of Sabishiro, where is located an historical flying field from which the Herndon-Pangborn trans-Pacific flight was started, may become a good international airport for a northern Pacific airway connecting Japan and America.

Several local airways in the provinces of the Japan Sea coast must be formed, and a connecting airway between Nagoya and Tokio or Osaka should be established. Fukuoka in Kyushu, Taihoku in Formosa and Dairen in Kwantung Province have good positions to become important central airports of Japanese air transportation for the future. After the extension of an airway to Shanghai, the route might be extended to Hongkong and connected to the airway in Saigon in French territory, and the airway to Taihoku from Fukuoka also could be extended to Hongkong to make a connection with the airway to Europe. At the same time this route would be extended to Manila in the Philippines. Consequently, Dairen, Fukuoka and Taihoku might become the first international airline landing fields in Japan.

After an amicable settlement of the Manchurian conflict, Dairen may become the junction point of airways to Peking or Tientsin and Tsingtao. The airway to Tsingtao might be extended to Shanghai and connect with the route to Nanking, and by proceeding in other directions to Harbin and Vladivostok and to Tsitsihar and Irkutsk, a good coverage of the Far East by airlines would be accomplished.

### METAL AIRPLANE CONSTRUCTION

(Continued from page 28)

and stiffening reinforcements are somewhat more complicated than in the case of corrugated covering, the use of the latter presents manufacturing difficulties which offset the benefits of simplified structure.

Even a general treatment of the subject of metal construction would be incomplete without a word of advice concerning the preparation of drawings. Unlike the experiences gained in the past with wood construction, the design of metal airplanes requires more thorough and complete drawings covering doubling (reinforcing) plates, brackets and all similar small items which, quite simple as they may appear, usually cause considerable delay, complication and increase in weight when attempted to be made up without detailed drawings "on the floor." While the major structure is naturally given careful attention by the engineering department, there is a tendency to postpone drawing up the smaller parts until the shop needs the parts for installation. When wood structure is used, a multitude of gadgets are often mounted on blocks, and supports glued or fastened by clamps. In metal structures an unplanned program of this sort results in a number of unnecessary reinforcements, stiffeners, doubling plates, etc., while on the other hand, if it had been considered in the drafting room, time and cost, weight and complications would be saved; in addition, it is common experience that parts made in the shop without drawings are seldom correctly recorded, and as a result, most information of this character is not available when it comes to building the second airplane.



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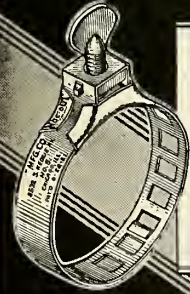
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Hornet B No. 1106.....	575	New	5,000
Axelton B-7.....	150	26	250
Cyclone No. 8610R 1700 A.B. 525.....	525	26	750
Wasp C-1 No. 4731.....	420	300	4,000

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J-5 WRIGHT WHIRLWIND—completely overhauled by Wright Distributors, including carburetor and magnetos. Priced Right. **PACIFIC AIRMOTIVE CORPORATION, Ltd.**  
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**CURTISS MOTORS:** We have cut the price of our OXX-6 motors from \$175 to \$70 and the OX5 to \$50. We have only a few left. These motors are rebuilt like new and are the best buy on the market today. Write for full information. Grant Marine Motor Co., 827 Whittier Blvd., Detroit, Michigan.

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**BARGAIN:** Sport Waco, model 125 with new late model 125 h.p. Siemens; ship just recovered, refinished, relicensed. Steel prop, airwheels, duals, short stacks, exhaust ring, spare motor; many other extras. \$1200 takes it all. Arthur Egbert, Green Lake, Wisc.

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**WACO J-5, \$1700;** Barling LeBlond \$900; Avlan Cirrus, \$700; Travel Air Gypsy, \$1500; Nicholas-Beazley Genet demonstrator, \$1600; Standard J-5, \$3000. Other bargains. Write for list. North-eastern Air Service, Bridgeport, Conn.

**OX-5 WACO,** Travel Air, Challenger, or Robin, pending recovering or work. License unnecessary, but must be eligible. Cheap for cash. William A. Houser, Route 10, Madisonville, Ohio.

**SALE OR TRADE:** Curtiss Robin, new covering, complete, dual ignition, hydraulic shocks, 1400 on ground. Duals. What have you? Tinsley Smith, 1227 Broad, Nashville, Tenn.

**AIRPLANE FOR SALE:** OXX-6 Challenger C-2; like new; three passenger; all instruments; reasonable. Remsen, 799 Hunterdon St., Newark, N. J.

**FOR QUICK SALE:** Waco #0, OX-5, recently completely recovered and NC licensed. Will take car in trade. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**BABY ACE CABIN** Monoplane, with new 45 h.p. Szekeley, \$650; OX American Eagle, complete, less cover, \$260; or fly away, \$550; Travel Air 2000 fuselage, with or without motor mount, upper left panel (light) upper right (heavy); left panels for 1929 C3 Spartan. Davis-Jackson Airplane Service, 8451 E. Harry St., Wichita, Kansas.

**AERONCA MOTOR E107-A** with prop, just overhauled, \$215; Aerona Scout, less powerplant, wind damaged wing tips, tail group including couple feet of fuselage, giveaway, \$150. Consider trades. Pigeon, Route 8, Wilmington, Ohio.

**FOR SALE:** Millerized OX Travel Air, very good, late model, extra, covering on lower wings damaged by horses. Price \$375. W. C. Lorenzen, 718 W. Madison St., Marshalltown, Ia.

**FOR SALE:** Licensed Franklin Sport #5; never been cracked. No time since complete overhaul; ready to fly away. Price \$1500. W. A. Borland, Rockland, Pa.

**UNLICENSED AEROMARINE - KLEMM,** LeBlond 60 h.p., low-wing monoplane with airwheels. Marvelous flyer and excellent for building up time for those in states not requiring licenses. Easy to fly and has very low landing speed. Purchaser must inspect ship. Price \$550. Laurence Raynolds, Allenhurst, New Jersey.

**CHALLENGER ROBIN,** sacrifice; completely recovered, just like new. Best buy in the country. Privately owned, excellent care. \$1200 cash. Robin, #9 Villa, Buffalo, N. Y.

**CURTISS ROBIN OX-5,** licensed; less than 80 hours time. Privately owned, never cracked and always hangared. Priced at \$575 for quick sale. Several other licensed OX-5 planes at low prices. L. J. Sipe, 29 S. Duke Street, York, Penna.

**NEW STANDARD D-25,** 5-place, J-5, like new; just relicensed. \$3,000. Waco 10, OX-5, rebuilt, fine condition, licensed, \$605. Aeromarine Klemm, LeBlond #5, perfect condition; just licensed, \$1195. Flying instruction free to all purchasers. Union Airways, Inc., Bloomfield Ave., Pine Brook, N. J.

**TRAVEL AIR** four-place cabin ship, powered with seven-cylinder J-6. Cost \$9000. Total time, 250 hours. Like new. Will sacrifice for best offer. Charles Lampel, 3247 Central Ave., Indianapolis, Ind.

**FOR SALE:** Brand new 45 h.p. Szekeley Buhl Bull Pup seaplane, complete with new pontoons, also undercarriage with airwheels. NC licensed as land or seaplane. A keen little outfit and priced to sell quick. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**CURTISS MF FLYING BOAT,** OXX-4 turns 1650, metal propeller, all in excellent condition, \$300 fly-away New Haven hangar. Licenseable. Lt. J. N. Zeller, U. S. Cayuga, C. G., Brooklyn Navy Yard, Brooklyn, N. Y.

**VELIE MONOCOUCPE,** 1929 model, stored since new. Has 30 hours. Newly licensed. Act quickly; \$700 cash; no less. Waco 90, 1930 model, with extra OX; \$750. J-5 motor complete, newly overhauled, with newly etched steel propeller, \$650. Carl Hanson, "Airport," Youngstown, Ohio.

**WACO, TRAVEL AIR, STINSON,** Fleet, Commandaire, all makes bought, sold and traded. Write your needs. We may have it. Pioneer Airplane Exchange, Airport, Syracuse, N. Y.

**TRAVEL AIR 2000,** OX-5 Millerized overhead; never crashed; licensed, private, always hangared. Will recover fuselage and tail. State color, \$750. Photo 10c. Grinnell, 2004 Upton, Toledo, Ohio.

**WILL SACRIFICE** lightplanes, 40 h.p., Driggs Dart 2, used 150 hours; air-worthy; less motor and instruments; welded (uncovered) fuselage, 20 x tires, 85-75-30 m.p.h., \$200. Photo 10c. Wanted: 35 h.p. Anzani motor and propeller, 1928 preferred; cheap. Grinnell, 2004 Upton, Toledo, Ohio.

**WACO F WARNER** demonstrator, excellent condition; bargain, \$2200. OXX-4 motor, Scintilla ignition, crated, only \$100. Free flying instruction on any Waco purchased, never used. Robbins Flying Service, Waco Distributors, Akron, Ohio.

**FOR SALE, SEAPLANE:** A real bargain. J-5 220 h.p. Waco land and seaplane. Ship is equipped with Edo deluxe pontoons, steel propeller and Heywood air starter. Complete undercarriage goes with this ship. Can be licensed either on land or water. A wonderful performing ship. Make us a proposition. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**FOR SALE:** Late model Heath convertible seaplane; running lights, instruments. Ship in perfect condition. Less motor, \$275. Samuel Wimley, Wildwood, New Jersey.

**DCAA CESSNA,** 300 Wright. Never cracked, practically new. No time since factory rebuilt. Previously 57 hours. \$300. AERO DIGEST, Box 1261.

**FOR SALE:** New Lawrence Ves twin valve-in-head motor. Test run 1 1/2 hrs. at 2100 r.p.m. Complete with propeller carburetor and distributor. Takes hot shot battery. A snap at \$20. Why fool with motorcycle conversions at this price? L. K. Williams, Route 1, Bedford, Iowa.

**FOR SALE:** J-5 Waco straight wing job with 325 hours, in good shape, for \$1750 cash. Wire Mid West Aviation Corporation, Omaha, Nebraska.

**INTERNATIONAL F-17 SPORTSMAN,** NC 11106, 3-place, powered with OXX-6 70 hours; in wonderful condition. Excellent ship to build up time and for barnstorming. First reasonable offer takes it. Write c/o Aerona Flying Club, Lunken Airport, Cincinnati, Ohio.

**STINSON JUNIOR,** NC229V, Lycoming motor, starter, landing lights, black and orange paint, 300 hours. Seats re-covered and whole ship in fine shape. Will sacrifice at \$2200 cash only. No trades. L. S. King, 1427 Hubbard Ave., Detroit, Mich.

**FOR SALE:** Waco 10 OX-5; first class condition, always hangared; should be seen, \$600. Roman J. Nemmers, Dell Rapids, South Dakota.

**STINSON MODEL SMB6** with Series C wash-instruments include rate of climb and bank and turn. Standard steel propeller, landing lights, electric starter, dual control wheels, and toilet. Eight hours since major motor overhaul. Ship recovered year ago. Painted international orange with gold and black trimming, interior blue velour. An 8-place ship in first class condition for only \$3500. Yellow Cab Airways, Des Moines, Iowa.

(Continued on page 110)

# CLASSIFIED ADVERTISEMENTS

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## Used Planes and Engines

**HEATH PARASOL**, less motor, welded type; Goodyear airwheels, instruments, two gas tanks; vermilion and black color; excellent condition. Can be bought for less than material cost. Heath, Boyers Airport, Melbourne, Ky.

**FOR SALE:** Stinson Junior 165 Wright, never cracked, licensed, used very little, new paint. Must sell at once; \$1875 cash. One 1931 American Eaglet, licensed; 30 h.p. Szekeley; 2-place; can't tell from new; \$595 cash. These ships are priced for quick sale. First here, first served. All letters answered. Murphy Bros., Robinson, Illinois.

**FOR SALE:** Warner Waco F. metal propeller, speed ring, 110 hours. Stinson Lycoming Deluxe, 200 hours. Waco J-5 Taper-wing, 170 hours since complete overhaul. All three ships in perfect condition. No reasonable offer refused. V. A. Rickard, Box 986, Schenectady, N. Y.

**FOR SALE:** TRAVEL AIR 2000, OX-5, just relicensed, \$500 cash. Ship at Flint, Michigan. Address: O. C. DuChaine, 1905 Cambridge, Ann Arbor, Michigan.

**BARGAIN CHALLENGER ROBIN:** Both ship and motor in first class condition. Just relicensed. Less than 250 hours on motor. Ship recovered. Navigation lights, brakes and auto instruments. Need money and first offer above \$1200 cash gets this real buy. No trades or terms. Address P. O. Box 918, Knoxville, Tenn.

**WACO 10-NC 6814;** recovered and rebuilt, like new. Act quickly and name your own color. 316 hours, Bosch magneto. A super bargain at \$775. Government approved ship. Will trade licensable ship needing work. Swoebrock Aviation Co., Box 176, Dept. 22, Ft. Wayne, Ind.

**1930 LICENSED AMERICAN EAGLE** Kinner, 190 h.p., 386 hours on, \$850 flying, Arcola Airport, Hackensack, N. J. J-5 steel prop. New Standard parts. D. C. Weisher, Bloomfield, Conn.

**TWO PLACE** side by side low wing monoplane; new, no motor; takes LeBlond 60; \$250. Art. La Violette, 7337 S. Honore, Chicago, Illinois.

**FOR SALE:** WACO 10 with full set instruments, including Scintilla magneto and Bosch booster. N. C. license. Write Emilio Balboni, 429 High Street, Clinton, Mass. Plane at Clinton Airport.

**TWO BI, J5 RYANS,** \$1500 and \$1800; J5 Cessna, total 80 hours, \$700. Hisco engine complete, \$40; J5 Micarta adjustable pitch propeller, \$50. J. W. Lytle, Box 263, Bridgeville, Pa.

**FOR SALE:** J-5 taper wing Waco; ship and motor completely overhauled and recovered. Wired for landing lights. Extra instruments, air speed, turn and bank compass; price \$1950. Write J. C. DuCote, 5093 Washington, St. Louis, Mo.

**CHALLENGER ROBIN:** Just completely overhauled and reconditioned. Beautiful paint job. Price \$1500. New Standard Flying Service, Box E, Hasbrouck Heights, New Jersey.

**SZEKELY ENGINES:** New, at bargain prices. AERO DIGEST, Box 1326.

**SACRIFICE SALE:** Taper Wing Waco, J-5 220 h.p., same as new; tripod undercarriage, Heywood air starter, steel propeller, speed ring on motor, and extra gas tank in undercarriage. V's for inverted flying. A real acrobatic and pleasure ship. Terms to responsible buyers. Write Becker-Fornier Flying Service, Inc., Jackson, Michigan.

**"EAGLET" PLANE,** Szekeley powered, fly-away; recently relicensed. Price \$700. Ralph Hannum, Downingtown, Penna.

**USED AIRPLANES, Bargains.** Licensed. Perfect condition. Monocoups, Wacos, Buhls. Many others. Write at once. Aircraft Brokerage & Finance Co., Room 200, 205 W. Wacker Drive, Chicago, Illinois.

**GYPSY MOTH:** Privately owned, two place, powered with 90 h.p. Gypsy engine. Just relicensed, never cracked, always hangared. Standard instruments, including compass, air speed, turn and bank, clock; semiballon wheels. Total time 260 hours. Price \$1500, including parachute. AERO DIGEST, Box 1333.

**FOR SALE:** 185 h.p. Challenger Robin, \$1350. A-1 condition, just relicensed. Will demonstrate within fifty miles of New York. O. J. Whitney, 3521-81st Street, Jackson Heights, N. Y.

**FOR SALE:** J-5 Eaglerock, steel prop, starter, etc. Licensed April 1st, always hangared, excellent condition. Best offer under two thousand takes it. N. Garnick, Diamondville, Wyoming.

**FOR SALE, SOME REAL BARGAINS:** Brand new Church Midwing, Heath B-4 motor, less cover, \$175. New Heath wings, covered, \$15 each. Heath tail surfaces, complete, \$12 uncovered. New B 4 motor, \$70. Heath-Henderson motor, ready to fly, \$35. Wright-Pugsley Co., Box 315, Dubuque, Iowa.

**CESSNA** four-place cabin monoplane with new Warner motor. Exceptionally well equipped, with Bendix oversize wheels and brakes, tail wheel, Pioneer Straightaway compass, turn and bank, and rate-of-climb indicators; new navigation lights in addition to regular equipment. Price \$1650. K. Russell Smith, 394 Wyoming Avenue, Wyoming, Penna.

**TODAY \$695** buys my sweet flying licensed Buhl Buhl 5up. Literally like new, 87 hours. All instruments. Airwheels. Lands 32, cruises 82, does 98. Operating cost, \$1.05 hourly. Herb. Laube, Box 133, Elizabeth, New Jersey.

**CURTISS HAMMONDSPORT OX5** Challenger, Scintilla magneto, Miller valve action, seldom flown and always by private owner; looks brand new, perfect condition, licensed, always hangared, never cracked, engine turns 1440 on ground. Frank M. Williams, 500 West Franklin St., Richmond, Virginia.

**YOU CAN'T BEAT THIS. OXK-6** Travel Air bi-plane, slightly used, like new. For quick sale, \$750 cash. A lot of airplane for the money. W. S. Lephew, Logan Field, Baltimore, Md.

**TRIMOTORED,** 10 passenger Bach. Just relicensed. Wasp and 2 Comet motors. \$3500. Equipped for night flying. 50 hours since complete overhaul. 1576 Union Avenue North, Portland, Oregon.

**FOR SALE:** Special Bellanca Skyrocket, total time 30 hours, cost \$21,500. Price \$15,000. JC-5 KR-34, total time 235 hours. Just had major overhaul. Price \$2250. Stinson Jr., Model S, 150 hours, condition excellent, \$3750. Kellett K-2 Autogiro, 200 hours factory overhaul, \$5500. Stearman J6-7, \$3500. Avian parts for sale. Wright Gypsy and metal propeller. George M. Pynchon Hangar, Roosevelt Field, Garden City, N. Y.

**STINSON JUNIOR,** beautiful little ship, Warner-powered, just completely repainted. Stinson colors. Has airwheels, steel propeller. Used 250 hours. \$1250. AERO DIGEST, Box 1327.

**FOR SALE:** Licensed Waco 10, never cracked, equipped with new OX5 motor, just out of original crate, with steel prop, Bendix wheels and brakes; paint, silver and green. Looks and flies like new. Reason for selling, must have larger ship. Deliver anywhere for expenses. \$950. I. M. Tull, Chapel Hill, North Carolina.

**FOR SALE:** Late model Velle M-5 "60" Monocoupe; good condition; licensed. Total time, 175 hours. Price, \$825. Do not confuse with low priced coupes which need considerable repair. F. M. Roberts, Jr., Bismarck, North Dakota.

**LAWRANCE 78 H.P. ENGINE,** used only two hours; complete with hub and prop. First money order for \$40 takes it or \$20 with order and balance. C. O. D. Chas. T. Smith, Macksville, Kansas.

**LEBLOND 85 h.p.:** 14 hours' time, \$387; Hamilton metal propeller, \$86; N.A.C.A. cowling, \$32; two 20 x 9-4 Goodyear air wheels, \$55. All practically new. Used in experimental plane only. A find at these prices. Also new Hamilton racing propeller, \$135; two stronger Heath size wings, \$45. Edward Lanier, 1426 S.W. 7th St., Miami, Florida.

**NEW STANDARD 5-PLACE J-5:** Ship cannot be told from new. Motor completely overhauled; no time since. Ship just repainted. Will sacrifice for immediate sale at \$2750. Emil Roth, Jr., Fayetteville, New York.

**ENGINEERED PLANE,** incomplete; Continental A-40 motor and finishing material, \$400. Unused licensed planes, \$400 less motor. Kinner American Eaglet, cheap takes it or \$20 with order and balance. New propellers, aircraft materials, cheap. Repairs, overhauling, lowest prices. McCoy Aircraft Service, Napoleon, Ohio.

**PITCAIRN AUTOGIRO,** three-place; like new, cost \$18,000; will take \$7,500. Airplane accepted in trade; need money. Also small farm. New hiplane parts, material. Investigate. AERO DIGEST, Box 1331.

**TRAVEL AIR OX5:** Just refinished, relicensed. Perfect condition, with detachable motor mount, lights, duals. Bargain at \$600. Consider Robin or Monocoupe in trade. Willard Huffman, Wauseon, Ohio.

## Miscellaneous Services Opportunities, Offers, etc.

**FOR RENT:** Clinton Airport. Good location and very dry land, with good growing grass on it. Rates very reasonable. R. B. Balboni, 429 High Street, Clinton, Mass.

**LICENSED MECHANICS, HELPERS:** Cable splicing can be learned in a few hours, \$1.00 with name and address will secure detailed instructions. P. O. Box 91, Elizabeth, N. J.

**FOR LEASE:** Airport close to Woonsocket; small rent or commission basis. Good opportunity for pilot with good biplane. Write Woonsocket Airways, Woonsocket, R. I.

**VALVE GUIDES REMOVED** and installed in Kinner, Warner, LeBlond, Velle and Szekeley, \$1.50 each. J-5 exhaust, \$5.95; intake, \$3. J-6 intake or exhaust, \$3.60. We furnish the guides. Also reconditioning of Kinner cam follower guide, \$3.50. Tappets, \$3.50 each, made like new. 24 hour service, guaranteed first class work. Also most complete stock replacement parts for all modern motors. Air Transport Equipment, Inc., Roosevelt Field, Garden City, N. Y.

**HYDRO GLIDING** at Camp Sokokis, on Long Lake, Bridgton, Maine, is a regular activity. Write Mr. Lewis C. Williams, A.M., Director, Hotel St. George, Brooklyn, N. Y.

**NEW YORK FLYING CLUB** offers membership for \$10 and instruction on Gypsy Moth at \$5 per lesson. AERO DIGEST, Box 1328.

**AIRPLANE AND ENGINE COURSE;** complete, non-technical; used by Curtiss-Wright and several governments. Now offered for the first time at \$5.00. AERO DIGEST, Box 1329.

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**INVENTOR'S UNIVERSAL EDUCATOR.** Contains 900 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., 602-C, Ouray Building, Washington, D. C.

**PATENT YOUR INVENTION:** Send for Free book, "How to Obtain a Patent," and "Record of Invention" blank. Consult us about how to protect your ideas. Victor J. Evans & Co., 634-C Victor Building, Washington, D. C.

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**FREE BOOKLET** and personal answers on patenting inventions. Sterling Buck, 25 years registered patent attorney. A629 F, Washington, D. C.

## Parachutes For Sale

**PARACHUTES:** Approved type. Seat, back, lap and chest, bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonist furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

# CLASSIFIED ADVERTISEMENTS

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## Wanted To Buy Or Trade

HAVE CASH for two-place licensed Aerona. Best price wins quick sale. Give details, license and factory numbers in first letter. AERO DIGEST, Box 1314.

HAVE CASH for your OX-5 airplane. Mean business. Price must be right. Best offer wins. Give full details. Must be licenseable. AERO DIGEST, Box 1316.

TRADE: Fifty mile Hacker Liberty custom speed boat for Lambert Monocoupe, Waco F or Great Lakes; licensed and perfect. George Fielding, Glens Falls, New York.

WILL PAY \$300 cash for two or three place licensed airplane. Walter, 10715 Fullerton Avenue, Detroit, Michigan.

WANTED: Used planes, two and three place. State lowest cash price, total time, etc. Must be licensed. AERO DIGEST, Box 1321.

WANTED: B-5 Kinner motors. State lowest cash price, hours and condition. Standard Steel props for Kinner K-5. Pioneer bank and turn, and climb indicators. Must be in good condition. Union Airways, Bloomfield Avenue, Pine Brook, N. J.

WANTED: Good licensed ship, in trade for a fully equipped auto repair and welding shop; plenty of tools. Located in good Brooklyn section. AERO DIGEST, Box 1322.

WHAT HAVE YOU to offer for corner plot, 60 x 100 or lot 20 x 100 or for both parcels; two blocks from subway. R. J. Lewis, 516 Flatbush Ave., Brooklyn, N. Y.

WANTED: Air cooled three place ship. Have cash. H. Bailey, Union City, Georgia.

LOOKING FOR PLANE priced below \$500. Will consider any type, including Jenny or Standard. Also consider cracked job. AERO DIGEST, Box 1323.

WANTED: Lycoming Stinson Junior in good shape. Give all information as to equipment and hours in first letter. Write Mid West Aviation Corp., Omaha, Nebraska.

WANTED TO BUY: One ship steel portable bangar, must be cheap. For sale: 220 Whirlwind straightwing Waco, \$1450; Waco ten Hiss and OX radiators; 30 x 5 Bendix wheels; J-5 inertia starter; E Hiss; J-6-5 Travel Air, Erie Isle Airways, Put-in-Bay, Ohio.

WANTED TO TRADE: 40 acres lake shore property, five boats, two cabins on excellent fishing and hunting lake. Will accept a good biplane as part payment. J. H. Krauss, Underwood, Minn.

WANTED: Have a Commander eight sport coupe, like new, or good well drilling rig, equipped for four-inch work, to trade for a two or three place licensed plane. Located in southeast Michigan. AERO DIGEST, Box 1325.

WANTED: Best buy in slightly used, late model 100 h.p. Kinner, with new type head. New Standard Flying Service, Box E, Hasbrouck Heights, New Jersey.

WANTED: Wings for J-6-9 Stinson SMIF; must be in airworthy and licensable condition. New Standard Flying Service, Box E, Hasbrouck Heights, New Jersey.

\$500 PUBLIC ADDRESS SYSTEM for airport or dance pavilion; factory made. Trade for airplane in flying condition, or time. Write Smith, 2319 M Street, Omaha, Nebraska.

WANTED: Used airplanes, licensed or unlicensed. Rising Sun Airport, Inc., Red Lion Road East of Philadelphia, Penna.

SPOT CASH paid for Wacos, Travel Airs, Birds, Monocoupes, or what have you. Give full particulars in first letter. 1406 Union & Peoples National Bank Bldg., Jackson, Michigan.

WANTED: AVRO AVIAN upper right wing, covered or uncovered. Must pass Department of Commerce inspection. Address reply to H. R. Raynor, Logan Field, Baltimore, Maryland.

BACHELOR without plane wants to own 90-125 h.p. air-cooled plane jointly with congenial party. Prefer bachelor, 25-35. Location, East Orange, N. J., or vicinity. AERO DIGEST, Box 1332.

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MODEL AIRPLANE MATERIAL: Five large sheets Japanese tissue 20 x 24; bundle various sizes balsa, rubber band and price list. All for 25¢; five kits for \$1.00. Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

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NEW THREE CYLINDER 60 h.p. Lawrance parts, for sale. I have on hand a limited number of new cylinders, pistons, rings, main bearings, pins, connecting rods, magnetos, etc. Also new valves. I can use some old three-cylinder Lawrance motors, or partly complete motors. M. Mickelson, Callaway, Minn.

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FOR SALE: New Monocoupe or Monoprep wings, very cheap. Write or inquire Roy Tooman, Jr., R. R. 6, Box 12, Muscatine, Iowa, or phone 2850.

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BARGAINS IN MOTORS, propellers, bubs, wheels for lightplanes, windwagons. Converted Indians, \$35. Fords, Chevrolets, \$50 to \$100. Propellers, \$4.75 to \$12; blueprints, \$5; circulars, 10c. Storms Aviation Co., Spartanburg, S. C.

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FOR SALE: 4-cylinder Scintilla magneto. Will fit Ford A conversion. Just overhauled. Complete with distributor blocks. \$25. Streed Electric Co., 1312 Harmon, Minneapolis, Minn.

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FOR SALE: Wright 300 parts, new. Rising Sun Airport, Red Lion Road, East of Boulevard, Philadelphia, Penna.

AERO CAMERA, 4 x 5 film pack, 10 pounds; fine photos; first \$75 takes it. Need cash. PT Swallow, less left wing; 2 motors; never flown; \$50; sell separately. New Jenny fuselage, recovered wings; ideal for school work; \$100. Fine Curtiss Challenger Fledgling, \$1,000. Write or wire AERO DIGEST, Box 1330.

(Continued on page 112)

## These Two Letters Tell The Same Story

**1** "I was very pleasantly surprised to learn the pulling power of your magazine from the small ad I ran a few months ago. I am enclosing check, for which please run the following ad in the next issue."\*

**2** "We have secured very good results from the advertisements previously placed in your magazine and trust we will continue to profit by our future advertisements in your magazine."\*

\* Names on request.

THEY tell a story of satisfaction; the satisfaction which results only from actual sales. AERO DIGEST, with its large circulation goes out and digs up new business for its advertisers. Through the classified columns of this publication you can reach the largest aviation market for very little cost. The rate is only 10 cents per word, \$2.50 minimum (payable in advance). Classified forms for June close May twenty-third.

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## Positions Wanted

**TRANSPORT PILOT:** Experienced ski and cold weather flying; now employed; best of references. AERO DIGEST, Box 1317.

**WANTED: A HEART.** In this vast metropolis there must be some organization or big executive with enough human interest to assist an executive-calibered, deserving married man, age 28. Though a licensed pilot and A&E mechanic, and a Marine Corps Reservist, I am desirous of a business connection. To the firm or man investing in me, I offer ample ability and a broad aviation and industrial experience. An investment in manhood is unusual, but this is an unusual case. Credentials as to character, ability, etc., will disclose real merit. Address Heart, P. O. Box No. 25, Brunswick, Ga.

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**YOUNG MAN,** 20, graduate in Master Mechanics and welding; also 24 hours flying. Wishes position in industry. Will go anywhere. Andrew Krogstad, Brighton, Michigan.

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# AERO DIGEST

**JUNE 1932**

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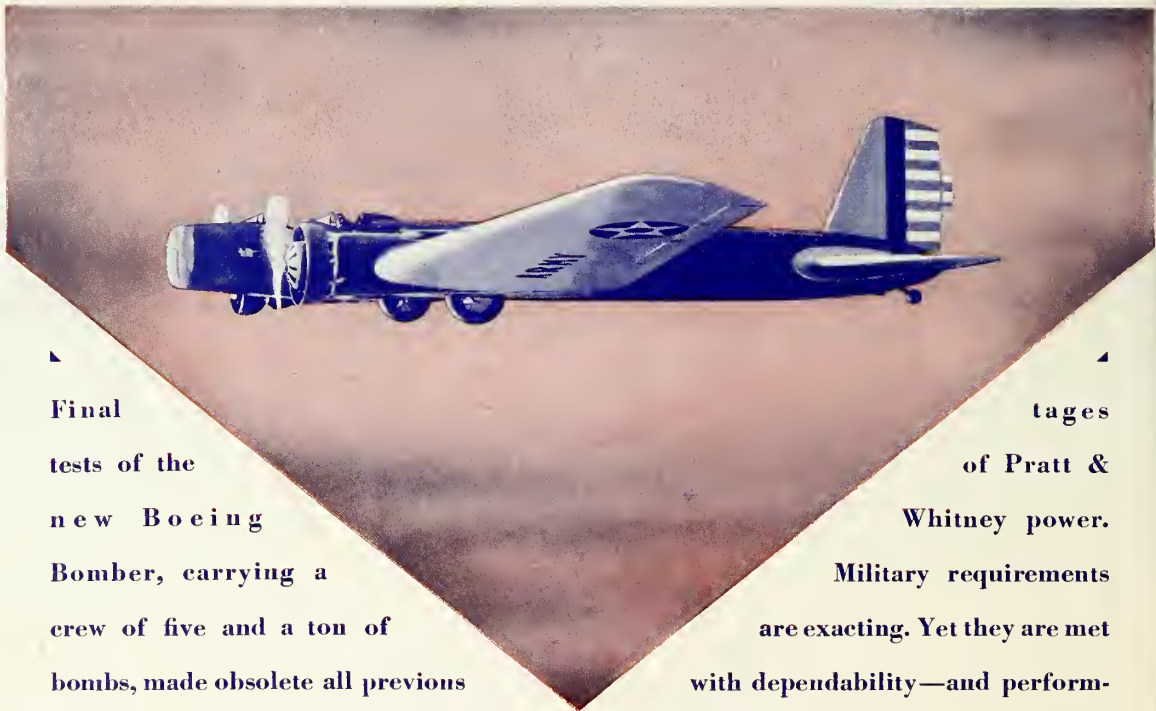
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FROM GENEVA**

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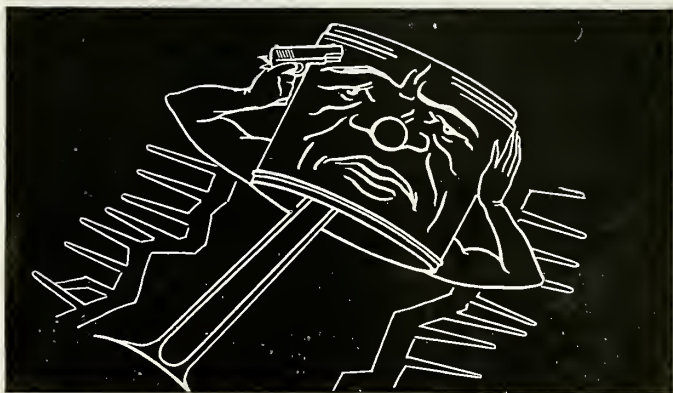
He may carry a maximum load of nearly 4½ tons on his head. His temperature may reach 600° F.

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Even with good lubricating oil he has nothing but an infinitesimal film to protect him from the hot metal walls of his cylinder prison.

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(Illustration Courtesy "The Sportsman Pilot")



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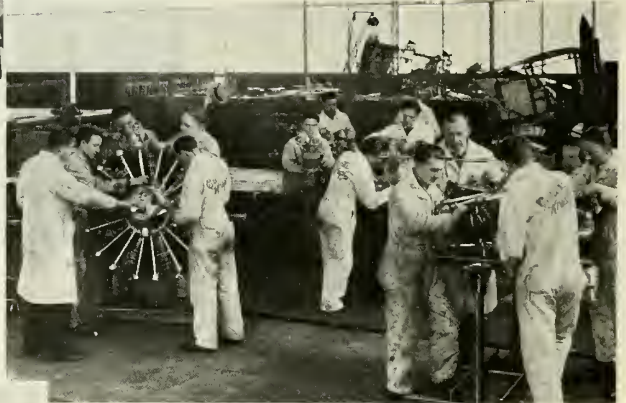


Airplane Mechanic

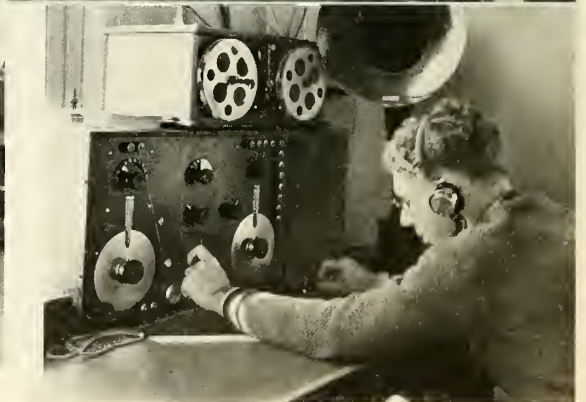
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# WHAT HAPPENS *if the engine quits?*



EVERY one who sees the Autogiro fly recognizes at once the characteristics which so sharply distinguish it from other aircraft. Every one assumes, and rightly, that these characteristics are derived from the rotor. Just why such results are assured by these four revolving blades is not so widely understood. "What if the engine quits?" is a question often asked by the uninitiated. As far as the rotor goes, nothing happens: because the rotor has no connection whatever with the engine or any other form of applied power when the Autogiro is in the air. Before the take-off it is brought to the rate of rotation necessary for flying by means of a clutch connection with the motor. The clutch is disengaged before the Autogiro leaves the ground. Once the Autogiro takes to the air, rotation is continued automatically by

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KELLETT, AUTOGIRO  
IN A STEEP CLIMB  
FROM TAKE-OFF

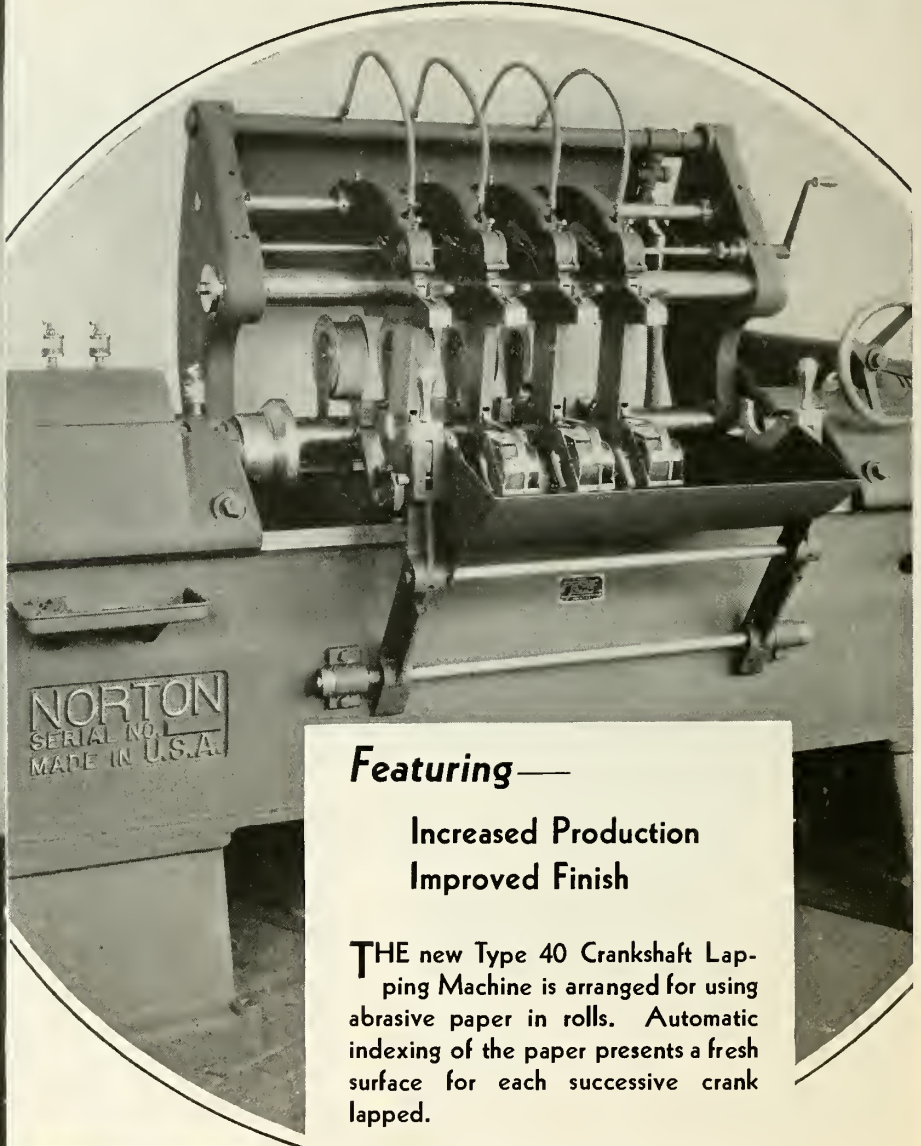
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*"When I read Mr. Parks' statement in a recent issue of Aero Digest, it clicked! I'm flying a transport run today on the strength of what I got at Parks, and I can assure you that what Mr. Parks said is the plain truth, . . . no more, no less. Any pilot who knows what's ahead of him will tell you the same thing."*

Did you read Mr. Parks' statement? He said, in part . . .

"The kind of man who could enter the aviation industry as a pilot two years ago with the qualifications required at that time is not adequately prepared to meet the problems of the present day. It is up to the aviation school to lay a foundation for the *continued* cultivation of such characteristics, habits and training as will enable the new type of pilot to meet today's demands for safety, skill and executive ability.

"Highly skilled technicians and pilots will receive a premium for their services during the next three or four years. During this period thousands of young men will decide that aviation is the field for them, but hundreds of these men will be too late to seize the best opportunities.

"Well-trained and thoroughly competent pilots with the proper amount of instrument experience . . . men of good, sound judgment who have been trained as business executives . . . will receive distinguished recognition as to both position and income and I think that the majority of the hit-and-miss-trained type of transport pilots will either receive additional executive training or revert to their original industries."

## ONLY THE *FULLY TRAINED* MAN SUCCEEDS

Only by preparing seriously for your work will you reach the top in aviation during the next few years. So great will be your opportunities that you cannot afford to face them without sound and complete preparation. You must be both aviator and business man . . . and Parks Air College believes in training that fits you for this dual

responsibility. What place have you chosen for yourself in the aviation industry of tomorrow? Is your aim high? Is your determination firm? Then at Parks Air College you will find the start you want . . . the solid basis of knowledge and the swift takeoff to your goal. Come to Parks!

### PARKS AIR COLLEGE

WORLD'S LARGEST COMMERCIAL FLYING SCHOOL

Section 6AD  
East St. Louis, Illinois

Get the new  
"Skyward Ho!"  
at once!

Read it carefully . . . make an intelligent decision in your choice of an aviation school. Use the coupon to request your copy of the book.



Send me "Skyward Ho!", with information about the course checked, for a young man of \_\_\_\_\_ (Age)

Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_

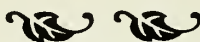
- Executive Transport Pilots' Course
- Transport Pilots' Course
- 28-week Executive Aviation Course
- Limited Commercial Pilots' Course
- Airplane and Engine Mechanics Courses

You are invited to visit and inspect **PARKS AIR COLLEGE**

**THE BURNELLI TRANSPORT** is the result of a thorough development program of construction, test flying, and research which has been carried forward since 1920.

The design is based on the flying wing type (an airfoil section with cargo space and multi-engines at the entering edge) applicable to military and commercial service.

The advancement of air transportation is dependent on a rapid increase in the inherent qualities of design to provide the maximum speed, safety and space with reduced construction and operating costs. An analysis of the Burnelli design relating to aerodynamics, power with structural arrangement, cargo space and mechanical details, clearly indicates that it will meet these essentials in a superior way. It correctly combines the aerodynamic efficiency of the single engine type with the power reliability and size increase of the nacelle type, plus other desirable safety and structural features.



## DESIGN COMPARISON

	High Speed Single Engine	Burnelli Twin Engine
Horsepower .....	425	1,200
Gross weight .....	4,700	13,300
Frontal area of fuselage, square feet..	17.5	50
H.P. per square foot of frontal area..	24.2	24
Cargo space, cubic feet.....	135	550
H.P. per cubic foot of cargo space...	3.15	2.12
Drag coefficient of body ideally faired..	.00016	.00022
Engine with cooling system.....	.00030	.00030
Lift coefficient of body.....	0	.0020
Equivalent wing area saving feet....	0	140
Equivalent resistance saving flat plate	0	1.22
Resulting comparative body resistance per 100 H.P. equivalent flat plate...	.305	.290
Percentage of engine power required by body at 190 m.p.h.....	28%	21%
Engine power required at 190 m.p.h. per 100 cubic feet of cargo space..	88	46

## PRACTICAL ADVANTAGES

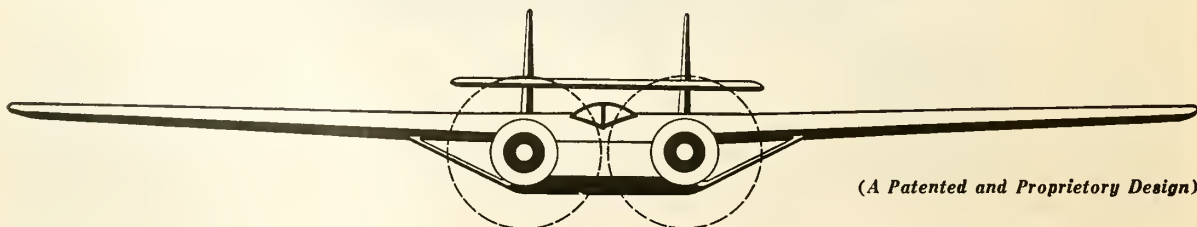
1. Accessible Multiple Engine Compartment, allowing inspection and minor repairs during flight.
2. Extensive Reduction of Head Resistance, necessary to high performance.
3. Reduced Turning Moment on One Engine, assisting flight with one motor operating.
4. Fuselage Lift Reduces Landing Speed, valuable for greater speed range.
5. Increased Capacity of Fuselage, maximum space for comfort and light cargo.
6. Practical Landing Gear Retraction, for increased aerodynamic efficiency.
7. Superior Safety in Operation. Protection afforded by engines and propellers being well forward of pilot's and passenger cabin.
8. Structural Efficiency and Simplicity. Stresses of engines, propellers and landing gear bear no relation to wing truss.
9. Convertible to Seaplane or Amphibion. The wide fuselage permits efficient twin float attachment interchangeable with landing gear.

## AERODYNAMIC BASES

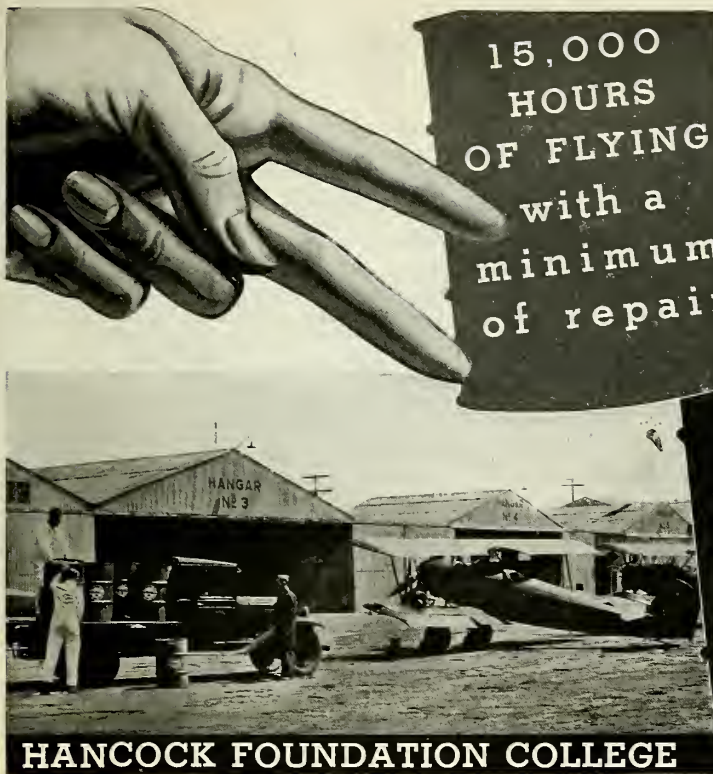
The aerodynamic advance of this design is due to the following as set forth and extracted from wind tunnel research report of the Guggenheim School of Aeronautics, New York University:

1. The use of airfoil shaped body while providing large internal space contributes substantially to the lift.
2. The body being of airfoil form has a very low drag coefficient.
3. The high wing monoplane gives the most efficient wing and body combination.
4. The design allows for retraction of the landing gear together with a high wing and body combination.
5. The design permits the use of twin engine installation without penalty in additional frontal area.

UPPERCU-BURNELLI CORPORATION, KEYPORT, NEW JERSEY



(A Patented and Proprietary Design)



HANCOCK FOUNDATION COLLEGE

Thanks to  
**KENDALL**  
 THE  
**30 HOUR**  
**OIL**

HANCOCK FOUNDATION COLLEGE  
 OF AERONAUTICS  
 SANTA MARIA, CALIF.

March 29, 1932

Kendall Refining Company  
 Bradford, Pa.

Gentlemen:

Enclosed you will find several photographs of some of our college planes, most of which have been in continuous service in the training of our flying cadets since May 1929, when Hancock College first opened its doors.

During this time this fleet of planes has amassed a total of some 15,000 hours of flying in student instruction alone! Despite the strenuous nature of this work, both planes and engines have given wonderful service with a minimum of repair and replacements necessary.

We feel that the almost exclusive use of Kendall Oils since the opening of the College has been an all-important factor in contributing to this record.

It is hoped that this information will be of interest to your organization.

Yours very truly

HANCOCK FOUNDATION COLLEGE  
 OF AERONAUTICS  
*W. H. [Signature]*  
 Chief of Staff  
 Major  
 U.S.A.  
 Superintendent

THE remarkable performance of Kendall Oil is appreciated most where there is work of a strenuous nature to be done. Continuous day-in-and-day-out service or flying with open throttle in the nation's speed contests puts an oil to severe test and it is under such conditions that Kendall, the 30 Hour Oil, proves its remarkable worth.

Less repair and replacement expense is a natural result of the better lubrication Kendall provides. And greater oil economy goes hand in hand with the 30 Hour performance you can count on with Kendall, if you merely maintain the proper oil level.

These extra advantages are given by Kendall because the oil is specially refined to make extraordinary performance possible. It costs more to give such extra care in refining—to make it entirely from 100% Bradford Grade Crude, the finest and costliest of all the Pennsylvania Oils—but the results are well worth it as every pilot who has ever used Kendall will agree.

We are frankly proud of Kendall Oil and the performance records it has made—and we believe most Kendall users are glad that there is such an oil available . . . and it is available at all important air fields throughout the country.

KENDALL REFINING COMPANY  
 BRADFORD, PENNA.

**KENDALL**  
 THE 30 HOUR OIL

MERELY MAINTAIN THE PROPER OIL LEVEL

THOROUGHbred **The Rearwin Jr.** OF ITS CLASS



## The Rearwin Jr. Brings "The Sport of Kings" Within the Reach of Many

DEEP blue skies, June weather, vacation, the lure of far-off places, the urge to *get away* and do things—don't they make you uneasy and restless? ¶ Come on—get off the ground! Go "upstairs", where space knows no confinement and speed no limit but the wide open throttle. Step on it—high, wide and handsome! ¶ Week-ends, holidays, vacations, evenings after hours, disport yourself in the style of kings and shake this thing called depression. ¶ Perhaps you don't realize it; but, if you can afford to buy and operate a medium priced car or a boat, you can afford to fly. For the Rearwin Jr. is priced as low as

\$1795. It will give you infinitely more pleasure than either a car or a boat—and it will cost you less than a dollar an hour to fly. Be modern. Be different. *Fly!* ¶ The Rearwin Jr. carries A.T.C. Nos. 434, 469 and 481. For power, you may have the 45 or 50 h.p. Szekely, the Aeromarine of 50 h.p., or the Jacobs 55 h.p. The Aeromarine and Jacobs, recent additions to Rearwin's powerplant selection, have been in successful operation for more than a year. ¶ Among the principal features

of the Rearwin Jr. are the cutaway center section; large cockpit entrance; removable dual controls; individual front and rear windshields; baggage compartment; stabilizer adjustable from either seat; rugged, 72" wide landing gear; shock absorbers; airwheels; extra large fuel capacity; optional, detachable winter enclosure; etc. ¶ Dealers will find this Rearwin product a profitable plane for its three-point market. Consistently advertised for almost two years, it is well known and equally as well liked. Our plan of factory and sales cooperation will appeal to the new dealer as well as to the experienced. Get the details.

*You  
can learn to fly for*

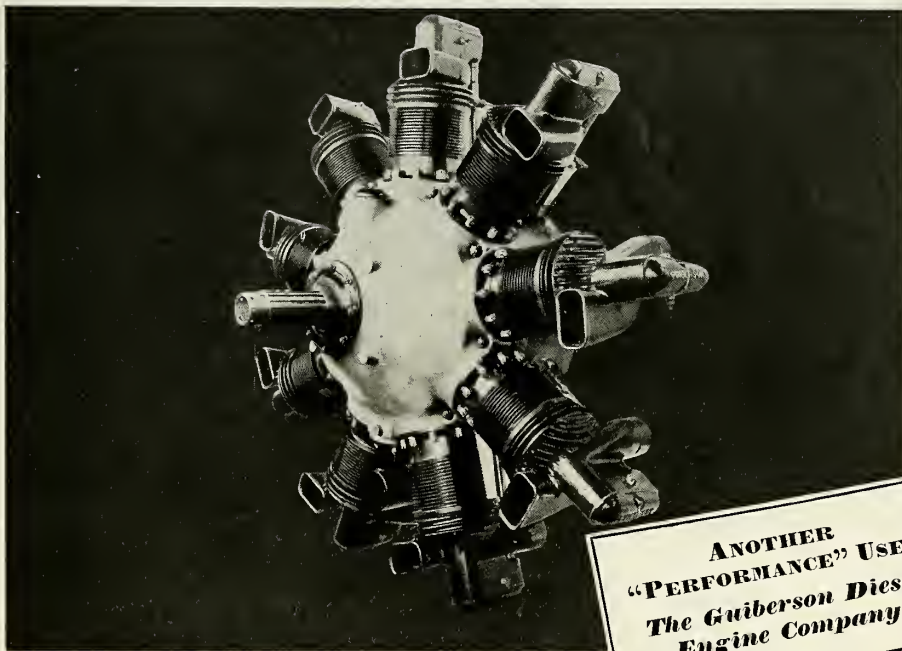
**Only \$10 An Hour**

Attend the Rearwin Flying School, where modern, individual instruction is given in easy-to-fly Rearwin Jrs. Learn to fly in less time and for less money. Learn how airplanes are made, at the Rearwin factory.

WRITE FOR DETAILS  
NOW!

REARWIN AIRPLANES, INCORPORATED, Fairfax Airport, Kansas City, Kansas

# PROVEN SKF BEARINGS SELECTED AGAIN FOR PERFORMANCE



ANOTHER  
"PERFORMANCE" USER  
The Guiberson Diesel  
Engine Company

## WHERE PERFORMANCE TAKES PREFERENCE OVER PRICE

Another new development... the Guiberson "Free wheeling" Diesel Air Motor...and again SKF Ball and Roller Bearings are selected for *known performance*. A total of 23 SKF's are used on the crankshaft, rocker arms, in the gear unit and to take the propeller thrust. Such wide application leaves no doubt that SKF Performance Takes Preference Over Price... a fitting complement to Guiberson's slogan, "Better be *Safe* than *Sorry*."

*You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little.*



To every important advance in aviation SKF Bearings have been a contributing factor. But more than that, consistent, everyday service, has shown SKF Bearings giving the dependability and long life so necessary in successful commercial and government flying. In the air, nothing takes the place of performance... and SKF's have the reliability that builds unshakable confidence.

SKF INDUSTRIES, INC. 40 EAST 34th STREET, NEW YORK, N. Y.

2887

# SKF

Ball and Roller Bearings



# Clean Design

efficient . .  
economical  
stronger . .

FIRST AROUND THE



WORLD

*Amphibion* **DOUGLAS**

DOUGLAS AIRCRAFT COMPANY, INC. SANTA MONICA, CALIFORNIA

# An Announcement of tremendous importance TO AVIATION STUDENTS



# RYAN SCHOOL OF AERONAUTICS

*Moves into* AMERICA'S FINEST TRAINING QUARTERS

FOR MORE THAN 14 YEARS T. Claude Ryan has been associated with aviation. Through his pioneering Ryan Airlines operated America's first regular aerial passenger service—the "Spirit of St. Louis," manufactured by the same company, carried the name of RYAN from New York to Paris—and the RYAN Flying School in San Diego became one of the oldest and best known in the United States. Under the personal supervision of T. Claude Ryan, a superior system of aeronautical instruction has been developed.

TO FITTINGLY HOUSE THIS SCHOOL of world-wide reputation, the Ryan School of Aeronautics now presents to its students this magnificent new group of ultra-modern buildings located on Lindbergh Field, San Diego's \$2,000,000 airport.

HERE, you will find the most modern equipment, complete facilities, valuable contacts—and a businesslike atmosphere of thoro, systematic flight and ground instruction. Here, three loading canopies are necessary to serve the frequent tri-motor commercial planes. Here, a moment's relaxation gives you a panorama of constant military flight maneuvers at North Island—the government's largest aviation base—across San Diego Bay, Ryan students make frequent inspection trips to this famous military flying field.

HERE, your advanced flight training will include 3,500 miles of marvelous cross-country trips over California's magnificent mountains, desert and ocean shore. Your night flying will be from a perfectly lighted airport. Your blind flying will be in a specially equipped training plane. Your tri-motor flights will be made from San Diego to Los Angeles and Hollywood—130 miles north.

NOW, more than ever before, the student who carefully investigates, who weighs all the facts, who wants the most of the best for his money, will select the Ryan School of Aeronautics for his aviation training. Never before have flight students received such complete instruction at the present low Ryan tuition rates.

*Enroll now as a Ryan student, and witness in San Diego on July 28th, one of the greatest massed flights in history. 300 military planes in one impressive formation will be reviewed by the President of the United States as a preliminary to the International Olympic Games in Southern California.*

TRANSPORT COURSES .....	From \$2535 to \$2675
LIMITED COMMERCIAL COURSES .....	From \$640 to \$785
PRIVATE PILOT COURSES .....	From \$250 to \$325
RYAN COMBINATION TRANSPORT COURSE—with Great Lakes airplane	\$3985

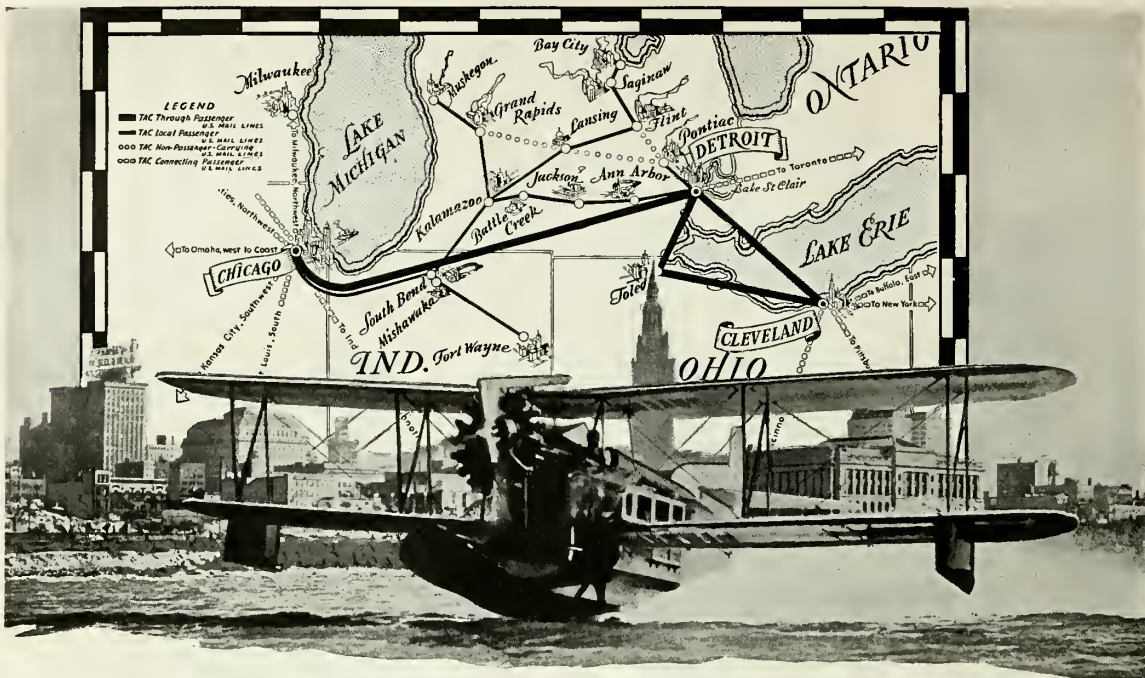
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CHECK HERE For further information about the RYAN "Training—plus Plane" \$3,985 Course  CHECK HERE For information regarding Transport, Limited Commercial and Private Flying or the Master Mechanic's Ground Course. (Underline which.)

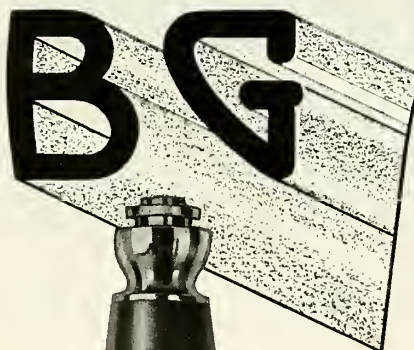


# RYAN SCHOOL OF AERONAUTICS

Lindbergh Field  
In Sunny SAN DIEGO, CALIFORNIA



Transamerican Airliners fly 5400 miles a day in the Great Lakes Region



Patented in the United States and other countries

**Transamerican Airlines Corp.**  
DIVISION OF THOMPSON AERONAUTICAL CORP.

U.S. AIR MAIL AM 27 **TAC** PASSENGERS EXPRESS

DIRECT REPLY TO  
 City Airport, Detroit, Mich., May 11, 1932

The B. G. Corporation,  
 156 W. 52d St.,  
 New York, N.Y.

Gentlemen:

Allow me to congratulate you upon the merits of your B.G.Plugs and your constant effort toward improved design. It is easily the most popular plug we have ever employed in nearly five years of air transport, sales and service operations in the Great Lakes Region.

B.G.Plugs represent standard equipment on all of TRANSAMERICAN AIRLINES' Cyclone, Wasp, Whirlwind and Lycoming-powered U.S.Air Mail, Passenger and Express planes, and are a most important item in the seven stations of our sales and service, or ground unit, THOMPSON AERONAUTICAL CORPORATION.

After observing at first hand their performance under the most severe of overland and trans-lake conditions, I am glad to provide you with such an expression.

Very truly yours,  
*J. V. Ryden*  
 J. V. Ryden,  
 Operations Manager

JIR:F

*The past words of today are through the air. Use the air mail.*

# THE B. G. CORPORATION

Contractors to the United States Army and Navy and Aircraft Engine Builders

136 WEST 52nd STREET, NEW YORK

Cable Address: Golsteco, New York



# 61,979 hours, 59 minutes

OR APPROXIMATELY 6,000,000 MILES

# flown by T.W.A. Ford Fleet



NINETEEN Ford all-metal tri-motored planes in the service of Transcontinental & Western Air, Inc., have flown the amazing total of sixty-one thousand, nine hundred and seventy-nine hours and fifty-nine minutes. The logs of the individual planes are noted in the column at the right.

T. W. A. is to be congratulated on the success of its operations and the efficiency of its flying and servicing personnel. The Ford Motor Company believes that the experience of this and many other airlines definitely

proves the outstanding economy of the Ford plane. Visit the Ford Airport and aircraft factory and inspect the many refinements of recent months. Write for particulars.

**The logs of 19 T. W. A. Ford Planes, Apr. 13**

600 . . . 3424 hrs. 4 mins.	611 . . . 3828 hrs. 30 mins.
601 . . . 2931 hrs. 29 mins.	612 . . . 3748 hrs. 23 mins.
602 . . . 3505 hrs. 57 mins.	613 . . . 3841 hrs. 51 mins.
603 . . . 3561 hrs. 28 mins.	614 . . . 2347 hrs. 27 mins.
604 . . . 3753 hrs. 57 mins.	615 . . . 3812 hrs. 15 mins.
605 . . . 3195 hrs. 49 mins.	616 . . . 2438 hrs. 8 mins.
606 . . . 3519 hrs. 34 mins.	617 . . . 2802 hrs. 20 mins.
607 . . . 3802 hrs. 24 mins.	700 . . . 2354 hrs. 20 mins.
608 . . . 3689 hrs. 49 mins.	702 . . . 2027 hrs. 48 mins.
610 . . . 3394 hrs. 26 mins.	

F O R D M O T O R C O M P A N Y

# Pilots like the Convenience of this new SAFETY CHUTE



1.

ONCE you wear a *Quick-Attachable* Safety Chute, you'll never say a parachute is inconvenient and clumsy. For Switlik, using the standard parachute pack, has designed a harness which eliminates all the parachute's former objections. Pilots like this new model because it is so easy to wear.

2.

As the illustrations show, you wear only the harness—the back or seat pack acts as your seat cushion. Merely snap the two quick connectors—one! two!!—and your parachute is ready to use.

The Switlik Safety Chute is standard in every respect—pack, harness, opening (up and over the back), four-point suspension, rip cord location and pull, etc.

For a very nominal cost, Switlik will convert your present type Safety Chute to the new *Quick-Attachable* model. Write direct to the factory for further details, or to the National Aviation Products, Inc., Central Airport, Camden, New Jersey.



3.



White Silk, \$275, including *Quick-Attachable Models* (Former prices, \$300 and \$325)  
Pongee Silk, \$225, (Former prices, \$240 and \$265)

## SWITLIK

### PARACHUTE & EQUIPMENT CO.

Broad & Dye Streets, Trenton, New Jersey

# **A**ny Flying Club can earn money if the Aeronca plan is followed.



an essential part of the plan. The long-life and proven reliability of this plane will spell the difference between success and failure . . . between profit and loss. Flying hours in an airplane are the only measure of its value. Since the entire plan is based on a depreciation cost of \$1.10 per hour, it is self-evident that any plane costing more than this per hour would not fit into the plan. Investigation quickly proves that Aeroncas are not only able to fly 1500 hours—but scores of them have actually exceeded this figure.

This Aeronca Flying Club booklet will be mailed to you for ten cents in coin or stamps. Write for it immediately.

*The Aeronca Club Plan booklet is of special interest to aircraft dealers, transport pilots and airport operators.*

.....write today!

**M**OST flying clubs organized along conventional lines run into difficulty shortly after their inception . . . because of internal dissension among the members. The dissatisfaction arising from improperly arranged flying schedules; the ill-will created by the lack of an operation and maintenance budget, and the general upheaval created by the usual absence of a reserve fund to finance accidental damage . . . all contribute to dissension—and eventual disorganization.

The Aeronca Flying Club Plan is the answer to all of this. It is radically different in its conception. Instead of adhering to the usual ideas, this plan is based on proven business principles. Instead of merely outlining the necessity of raising enough money to purchase a plane, it goes into detail re-

garding the method of operating a club at a ridiculously low cost for the members—in a manner which absolutely prevents the possibility of dissatisfaction.

Best of all, however, this Aeronca Flying Club Plan shows how a club can actually *earn* money . . . instead of only spending it. Besides assuring ample finances for operation, this plan goes beyond mere low-cost flying time for members . . . and presents a plan which pays dividends on the original investment. These dividends can easily be made to equal the original investment . . . which means a 100% profit . . . and still permit you to fly for as little as \$2.50 per hour. This club is more than a club idea . . . it is a business enterprise which will be appealing to anyone who wants to invest money profitably.

An Aeronca Collegian is, of course,

**Specifications:** Wing span, 36 ft; chord, 50 in; length, 20 ft; height, 7 ft. 10 in. Weight, empty, 461 lbs; useful load 414 lbs; gross weight, 875 lbs; Gas, 8 gallons; oil, 3 qts; Wing loading, 6.15 lbs; power loading, 25 lbs. Aeronca Motor E113A, 40 H. P. at 2500 R. P. M. Fuel consumption, 2½ gallons per hour. Oil consumption, — pint per hour.

**Performance:**

High speed.....	85 M. P. H.
Cruising speed.....	70 M. P. H.
Landing speed.....	35 M. P. H.
Climb (with gross load).....	450 ft. per min.
Gliding Angle.....	10 to 1
Service ceiling.....	12,000 ft.
Absolute ceiling.....	16,000 ft.
Cruising range.....	200 miles

**Construction:** Fuselage, chrome-molybdenum steel tubing, fabric covered. Wings, solid spruce spars, Clark Y spruce ribs, solid spruce or bass compression ribs, dural leading and trailing edges, double dragwire, top and bottom. Ailerons, duralumin. Empennage, welded steel tubing, fabric covered. Landing gear, Oleo type, with heat-treated chrome-molybdenum steel axle and improved Goodyear air wheels.

Price open with oleo gear—\$1730; with enclosure, \$1790.

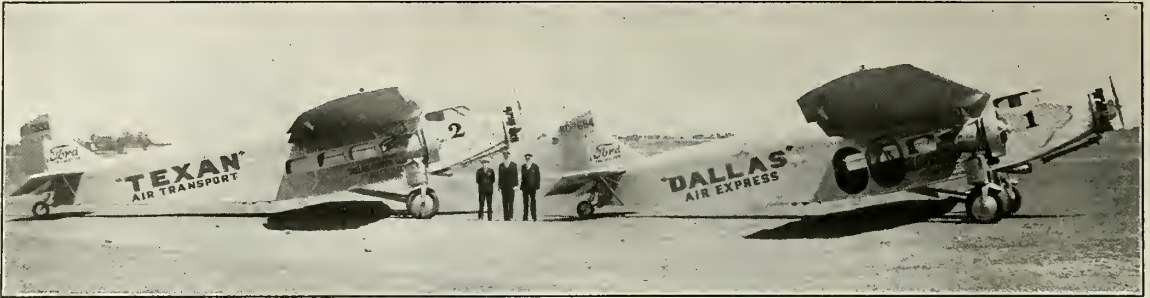


**A E R O N C A**

*Compare it with the others if you really want to be convinced.....*

AERONAUTICAL CORPORATION OF AMERICA  
LUNKEN AIRPORT . . . CINCINNATI, OHIO

# Dallas Aviation School and Air College DALLAS TEXAS



The best there is, right here for all students. No obsolete worn out ships or motors

## On - To - DALLAS - NOW! WHY - PAY - MORE ?

### PRIVATE PILOTS' COURSE

With Complete Ground Course.....	\$350.00
Less Cash Bonus .....	25.00
Less 5% additional for cash in full.....	16.25
Net Price to you.....	308.75
One-half Railroad fare to Dallas.....	Free
1 pair non-shatterable goggles.....	Free

### LIMITED COMMERCIAL COURSE

With Complete Ground Course.....	\$795.00
Less Cash Bonus .....	50.00
Less 5% for cash in full.....	37.25
Net Price to you .....	707.75
Full Railroad fare to Dallas.....	Free
1 pair non-shatterable goggles.....	Free
1 good leather helmet.....	Free
\$50.00 worth part time work for each student at 50c per hour if desired to help pay board and room.	

### TRANSPORT PILOTS' COURSE

With Complete Ground Course.....	\$2,500.00
Less Cash Bonus .....	200.00
Less 5% for cash in full.....	115.00
Net Price to you.....	2,185.00
Railroad fare to Dallas.....	Free
1 pair non-shatterable goggles.....	Free
1 good leather helmet.....	Free
1 set Cadet System, 4 Vol.....	Free
\$100.00 worth part time work at 50c per hour for each student if desired to help pay board and room.	

### MASTER MECHANICS' COURSE

	\$350.00
Less Cash Bonus .....	25.00
Less 5% for cash in full.....	16.25
Net Price to you.....	308.75
One-half Railroad fare .....	Free
\$10.00 worth aviation motor tools.....	Free
\$100.00 worth part time work at 50c per hour for each student if desired to help pay board and room.	

## A 100% GOVERNMENT APPROVED FLYING AND GROUND SCHOOL

### Advantages Here

1. No OX5 Motors
2. All Air Cooled equipment
3. Finest airport in U. S.
4. Commercial aviation in all its branches
5. Board and room right at the school
6. No bonds for breakage
7. Strictly commercial—no military discipline
8. A successful school for many years
9. We keep faith with our students
10. Start flying the day you arrive.

### Students Come Here

from Maine to California and Canada to the Gulf. We always have a big crowd of earnest, progressive young men here from everywhere and each and every one of them completes his courses on schedule time successfully. The big days are yet to come in Aviation and Dallas graduates are second to none in U. S. because when they leave here they know commercial and mechanical aviation at its best. Write or wire us at our expense for our new catalog and complete information. We guarantee every statement we make.

**Dallas Aviation School  
and Air College.** Love Field  
Dallas, Texas

### Cross Country Trips

All flight students and mechanical students are given cross country trips in our Big Tri-motored Fords and other ships.

We work 5½ days a week and rest the other 1½ days.

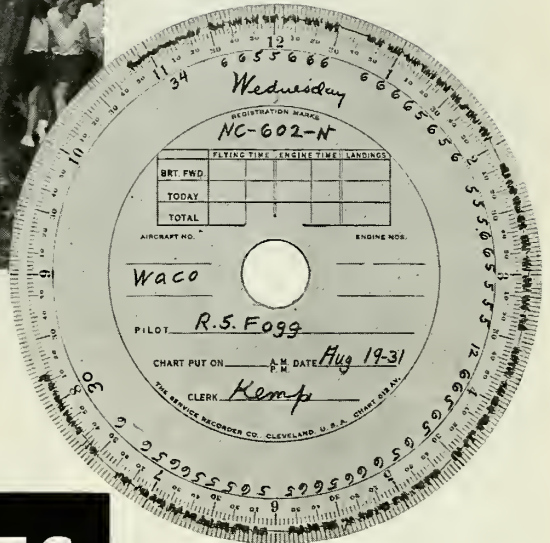
Every student given a chance to earn pocket money.

Everything is very much to your advantage here. No regrets—no disappointments. Happy days at Dallas!

Write or wire NOW for Catalog!



Pay loads o-plenty when a Newhamco seaplane, equipped with EDO Floats, goes out looking for business. 102 passengers agreed with the Newhamco slogan: "Enjoy seaplane safety."



An actual reproduction of the clock dial card of the Newhamco seaplane on which the actual flying time is automatically recorded. The dark markings on the edge of the dial are made when the engine is speeded up—with intervals between when the plane is at rest.

# EDO FLOATS

## FOR PAY LOADS... REAL PERFORMANCE!

ON a quiet, mid-week day, Wednesday, August 19th, Vice-President Bob Fogg and Mechanic "Chuck" Kent, of Newhamco Air Service, boarded one of their EDO-equipped Waco seaplanes at their base on Lake Winnepesaukee, New Hampshire. Starting at 10:50, they made a half-hour flight to Post Mills on Lake Fairlee, Vermont.

From the time of their arrival until 7:42 in the afternoon, with only time out for refuelling, Pilot Fogg made 51 five- and six-minute flights and carried 102 passengers at \$3.00 apiece. At 8:12 the seaplane was back at its home base.

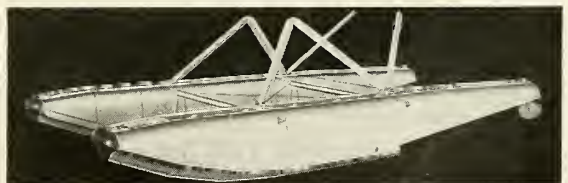
In one day of 5 hours and 43 minutes of actual flying time, as shown on the automatic log, this enterprising air service had earned \$306.00!

This is a typical example of the splendid business oppor-

tunities that are opened to air service operators who have their planes equipped with EDO Floats. No waiting at the field till week-end visitors arrive—less competition—no dependence on nor rental for flying fields as a temporary base of operations. With EDO Floats, pilots fly to their market in hundreds of cities and towns bordering the waterways. 1931 was a successful year for seaplane operators. Ready pay loads and steady profits will be the reward of those who prepare now with EDO'S for 1932.

Write today for complete details of EDO'S 11 Standard float models, and a list of over 40 types of land planes on which they are interchangeable with wheel landing gear, without change in license status. Address EDO Aircraft Corporation, 610 Second St., College Point, Long Island, N. Y.

NOW  
**25%**  
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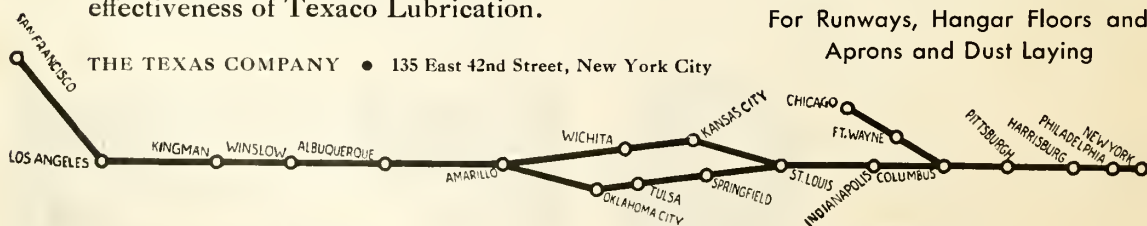
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# AERO DIGEST

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Vol. 20

**JUNE**

No. 6

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(Photo by Lieut. George R. Johnson, courtesy of Aerial Explorations, Inc.)

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*U. S. Army Air Corps, Hamilton Maxwell and Fairchild Aerial Surveys photos*

### SCENES WHICH GREET THE AIR TRAVELER

Mount Hood, Niagara Falls, a California orange grove and the famous Plaza at Havana—passing glimpses of contrasting appeal intensified in interest when seen from the sky



# AIR—HOT AND OTHERWISE

## STOP THE CHISELING



Frank A. Tichenor

**B**Y the time this issue of AERO DIGEST reaches its readers, Congress will have changed its tactical base from the District of Columbia to Chicago, where the national conventions of both parties will be held this month. In the meantime, the efforts of both Republican and Democratic Senators and Congressmen will be devoted to virtually similar efforts—vociferously advertised but so far really meaning little—to lift some of the taxation from the already burdened shoulders of the American people.

The two parties are supposed to have become united in this praiseworthy endeavor. They are really divided concerning everything that has to do with the welfare of the man in the street. This ignores that splendid early motto of this nation, "United We Stand, Divided We Fall!" There has been no real union in the public interest. Congress has been divided upon everything that concerns it. Congress has not been thinking of the public welfare; it has been thinking of the one thing upon which it is united—possession of the spoils.

Pick up any copy of *The Congressional Record* (if, being jobless at the moment, as so many are, you have nothing better to do, and if you have curiosity venturesome beyond boredom) and find that the speeches which it preserves for a posterity that is sure to be indifferent show slight Congressional interest in the general well being, but much in that of the makers of the speeches. Most of these outpourings are intended for home consumption only. Anything to secure continuance on the payroll of Uncle Sam!

Never since the first meeting of Congress has there been such utter lack of any constructive leadership upon the floors of the two houses and within the ranks of the two now dominant parties, the result being evident in a failure by about two billion dollars to balance the budget. "Forget it!" say the Democrats. "Let's get possession of the Government. The Republicans have had it long enough!"

Almost like an echo comes the Republican refrain: "The budget? Oh, forget it! Let's make sure of keeping in the driver's seat. It pays."

In that detail of Congressional thought, and in that detail only, is there sweet harmony.

Every war we've ever fought has piled millions upon millions of indebtedness upon the backs of taxpayers, indebtedness which could have been avoided if national defense, the fundamental concern of the true patriot, had been given the appropriations necessary to insure safety.

With such lack of leadership as now characterizes Washington, it is not surprising that the aircraft industry also should be disorganized. The domestic Air Mail operators are fighting the operators carrying foreign mail by air. Each yearns for the lion's share of the appropriations.

This is silly, poor business, bad ethics, bad for the aircraft industry. There is enough Air Mail money for both, and there would have been much more if the absurdly warring groups had stood together in fact, not in fancy,

presenting a united front at the committee hearings and not trying to outwit each other.

Such not infrequent absurdities of the aeronautical industry would be laughable if they were not heart-breaking. The battle of the Aeronautical Chamber of Commerce against the LaGuardia Bill, which aims to bring airway personnel under the provisions of the Railway Labor Act, is another case in point. The fight against this Bill is a mistake. Congressman LaGuardia is one of the ablest and most faithful friends possessed by the air industry. He has shown it many times during the present Congress and in others. His battle against the Vinson Bill, which would do away with the Air Secretaries, was sufficient proof of where he stands.

The Air Mail pilot is entitled to fair pay. He earns it. LaGuardia, who is a pilot, knows that. His fight for the protection of the pilot is an honest, worthy one. LaGuardia is not subsidized by the Federal Government. But let extracts from a letter I have just received from him tell its own story:

May 24th, 1932.

"Dear Frank:

"I am sorry to note the opposition on the part of the operators, some of the manufacturers and the Aeronautical Chamber of Commerce to the bill bringing air personnel under the provisions of the Railway Labor Act.

"They are making a big mistake. Congress has been very good to operators. Such opposition is contrary to the best interests of the industry and personally offensive to a great many of us.

"If Congress is going to appropriate millions of dollars to help the industry, I do not see how the industry can take the position of refusing to give their flying personnel a square deal.

"All the bill does is to afford existing governmental machinery for the settlement of disputes. What is wrong about that?"

At a hearing on this Bill, a letter signed by Charles Lawrance, president of the Aeronautical Chamber of Commerce, protested against a favorable report, though really there has been comparatively little trouble between the pilots and the operators. In most cases the executives on the Air Mail lines have worked with the pilots, paying them well, and everybody has been happy. The pilots have stood for cuts when income has been depleted. There is nothing detrimental in the Bill, and it should have the industry's whole-souled support. Such negative action as has been taken by the Chamber tends to create trouble.

After a few more blunders of this sort, it may be that the members of the organization will take sufficient interest in its affairs to see to it that its recommendations represent the thought of the entire membership. I hope this noteworthy improvement in procedure will not be deferred until too late.

# WEIGHTY AFFAIRS OF ANTS AND MEN

*by Caldwell*

I SEE the air above the Atlantic Ocean is open for navigation again. Each fall they pack it away in moth balls for the winter, but shortly after the first venturesome robin of spring is observed, good old Doc Kimball dusts off his instruments down at the U. S. Weather Bureau, takes a squint at the sky and says, "Boys, it looks all right from here." And the first thing you know one of the bold lads is off to Europe. And the next thing you hear he's aboard Captain Fried's ship, headed back to New York. We live in a fast age: Off again, gone again, down again, back again, Finnegan. Yo ho, lads! Pull for the ship.

Well, it all adds to the gaiety of nations in these drab times. Having long since given up searching for any meaning whatever in the affairs of mice, men and Democrats, I now find one human activity quite as full of meaning as another. After all, life is largely a matter of passing our time as pleasantly as possible, kidding ourselves along with this or that, until at last we are worn out and don't have to bother any more. One man does it by building up a vast business for his heirs to fight over; another by preaching pacifism or entering politics or radio crooning or hopping over oceans. There's no essential difference between these various activities. Each man is simply passing his time in the manner that seems most agreeable or expedient to him.

I watched an ant the other day. He had a bit of wood about five times the size of himself that he was dragging along with tremendous difficulty. He took it from beneath a rose bush, dragged it about two feet to a concrete walk, dropped it, examined it closely, ran around it three times and then dragged it back to the very rose bush he'd hauled it from and there abandoned it. What was in his mind, anyhow? He couldn't eat that wood, he couldn't build anything with it and he couldn't take it down the ant hill in which he finally vanished. While he was struggling along with the wood, seven other ants ran up at intervals and felt his head, after which they hurriedly went their ways. I believe they came to the conclusion that he was crazy. Perhaps he was—I suppose ants do go crazy. Yet he may have been quite sane. Perhaps—who knows?—he was saying to himself, "Very few ants can do this. I'm doing what not one ant in 10,000 can do. I perceive I am an exceptional ant, and I feel very bucked up about it all. The chesty feeling is quite worth the labor." Anyhow, I watched him for an hour, so if he was goofy I was just as goofy as he was. Both of us, by all the generally accepted rules of ants and men, were wasting our time, frittering it away uselessly.

However, what's useful and what's useless anyhow? Flying across an ocean always has seemed to me a peculiarly meaningless operation. Yet it must have a meaning to millions of people, because look at the boom that hit aviation a wallop right after those ocean flights of 1927. Of course, a good part of that boom was due to the Army

and Navy five-year procurement plan and to the air mail contracts; and a lot more of it must be credited to the fact that everything boomed, more or less. But allowing for all that, what actually got the mass of the public interested in all phases of aviation, from buying stocks to flying themselves, was the vast amount of favorable publicity attending the successful ocean flights. I don't believe now that the unsuccessful flights had an adverse effect of five per cent compared to a ninety-five per cent favorable effect of the successful ones. You see the public—God bless 'em!—have a peculiar habit of remembering the hits and forgetting the misses. That's why they keep on voting a straight party ticket.

I'll never stop kicking myself for failing to assay correctly the public's response to the emotional urge of those ocean flights. Although I never suspected it, from the very moment that the long nose and artistic locks of the public relations counsel were displayed to the breeze of our flying fields, prosperity was headed aviation's way. And I was asleep at the switch. I saw, too late, what I should have done. I should have bought four-dollar options on abandoned farms near cities and later sold them to municipalities and great corporations for airports. For in no time at all the farmers, who had been waiting vainly for Farm Relief, found themselves being relieved of big tracts of flat earth on which, up to that time, they hadn't been able to raise even another mortgage, let alone crops. At once there set in a Retreat from the Soil that hadn't been witnessed before in the history of civilization—which is really a history of a long series of retreats. Ancient denizens of the rural regions hugged to their whisker-covered bosoms large bundles of cash, in exchange for which they joyfully handed over their title deeds, mortgages and old overalls. Soon they were found in night clubs and tuxedos, in Rolls-Royces and divorce courts. Patience and industry were rewarded.

Then there was the slightly pathetic owner of a small aircraft factory. He was born poor, lived poor and with the help of the Lord hoped he wouldn't die any poorer. That's all he asked. If he could get by he was content. He sold, with superhuman effort, a dozen or so airplanes a year; in five years he hoped, rather wistfully, that he could step his sales up another dozen. His wildest dreams never carried him beyond three planes a month.

He was sitting in his office on a day after these ocean flights had rambled over the front pages, when a large, prosperous looking man with money and fifty-cent cigars falling out of his pockets dashed in shouting wildly, "I'll give you a million in cash and stock for the plant—sign this!" In a daze the old factory owner signed, was hit on the head with a bundle of thousand-dollar bills and stock certificates, fainted, and hours later came to, a millionaire. Within a year he had a Jap butler, a Hispano-Suiza car, a new wife and a nervous breakdown.

*(Continued on page 74)*

# GENEVA'S WARNING TO AVIATION

Major General James E. Fechet, U. S. Army, (Ret.)

ONCE again this spring we have been treated by the bickerings at Geneva to the spectacle of a world problem turned into a farce. The guardians of our National Defense—those who see it as their rightful duty to forestall the international hysteria of a passing moment, such as that which has been generated in recent years around that misunderstood word "Peace," from being disastrously committed to treaty permanency—are not called upon to belittle such undertakings as the current international disarmament conference. It is not meet that they should do so. Also, there is no need for them to do it.

But few of those who have been permitted to stand on the firing line at Geneva this spring appear to have been aware of the real danger which has been developing there. We need not be too critical in this instance. It may be merely a lack of perspective that causes them to act so. From a greater distance, and with problems of National Defense as my sole concern, I have sifted a grain of truth from the thousands of words of chaff which have come back to us from overseas. And it is a truth which may be of great value when air armament is taken up at future international disarmament meetings.

For the first time this spring, at the current disturbance at Geneva, the question of aviation was taken up as a subject of international disarmament. It was taken up only tentatively, and "in committee" and little of immediate concrete effect was expected from the newly organized Geneva Air Commission. The initial and only work of this commission was to call for a listing of the air powers of the world in the order of their strength; and the only result was a disconcerting commotion as each country fought for last place.

This is a time-honored and customary move at peace conferences: The fight for last place. If it were the only move, there would be no cause for concern. Disarmament conferences then would resolve themselves into a contin-

uous game to see who would be last in admitted strength. No good would be achieved by the game, but also no harm could possibly result. This, however, is only the initial move. More serious stages follow, stages which produce bickering, bad-will and permanent ill-feeling.

Those who have been at Geneva have been able to see little else for months. One expert has said, "The Arms Conference thus far has been nothing but rows." Another commentator, writing under the eloquent head, "Reality Dawns at Geneva," asserts that no lessons have been learned there save the one of the realization of the futility of the meeting, "of convenient excuses," "of technological subterfuges," "international blocs," etc. It seems to me that these commentators, blinded by the confusion surrounding them, have missed the real lesson which has been taught at Geneva this spring. Behind the "reality of the futility" there should have been apparent the mode of trickery employed, the willingness of each delegate to swap a blind horse for a good piece of war machinery; to approve an interdiction against a piece of machinery, or a method of operation which he himself cannot master in exchange for a ruling against a mode or means of warfare which his own country could not parry in actual battle.

Aviation now stands in imminent danger of being lost in just such an under-the-table transaction.

In one of the late and recent stages of the conference we find Japan asking for the outlawing of the aircraft carrier as too potent a weapon of offensive warfare. Japan has had ample opportunity to experiment with the aircraft carrier. What lessons she has learned we do not know. Perhaps the aircraft carrier does not fit into her war plans. It is not improbable that this highly intricate microcosm of machinery is beyond the capacities of those with whom it must be trusted for operation. Certainly Japan cannot be unaware that handicapped though it has been for many years as to numbers of these craft, a power

(Continued on page 87)



Aircraft carrier *U.S.S. Saratoga*, the use of which type of craft Japan asks the Geneva Conference to outlaw

# EDITORIALS

## U. S. Air Mail

**A**MERICAN business, while not yet as alive to the advantages of Air Mail as it eventually will be, is using it with increasing enthusiasm and, in consequence, is gaining more and more from it. That the effects of the slump have been proportionately less evident in Air Mail than in ordinary mail is emphatically significant. It is very stimulative, at a time when a stimulant is needed, to know that no airway service in the world equals that which is rendered by our American mail pilots and planes.

That 80,000 miles are daily flown over routes totaling in excess of 28,000 miles is an announcement which can be made with truth today, yet if expressed as a prediction a few years ago it would have been regarded as foolishness. Our Air Mail routes have been developed up to the limit of existing knowledge and are adding new technique and equipment to them as these come into being.

Radio-telephony, as it is available to our Air Mail, is familiar to millions who never have ridden in a plane, through the efforts of our broadcasters to find a dramatic source of instructive entertainment for our listeners-in. Radio-telephony is rarely used for such purposes, but it adds greatly to the usefulness and safety of Air Mail, its prime purpose. The radio-beacon and other new devices familiar on our marked and lighted airways are wonderfully effective.

Two hundred cities are directly served by our Air Mail. Postal matter mailed anywhere, if scheduled for a lengthy journey within the boundaries of the United States, are greatly expedited when marked and stamped for the Air Mail. The service now can be insured and is open to the carriage of parcels. United States Air Mail stamps insure available Air Mail carriage in Canada, Central and South America, and air transport of mail which must travel considerable distances in Europe can be arranged. Your postmaster can give you details.

It is comforting to know that Air Mail continually is improving and that inevitably it must be an influence tending to decrease the severity of the business slump which would be far more pronounced without Air Mail!

Those in the aircraft industry know the value of Air Mail. They can teach other industries its importance in the most convincing manner by using it more frequently themselves. . . . *nuf ced.*

## Amelia Earhart

**A**TLANTIC flying has been principally a man's game—but now the woman has zoomed in and taken her full share of glory from it. Aviation in America (indeed all America in every line) is proud of Amelia Earhart Putnam. That she should have shown extraordinary skill, coolness, clearheadedness and the superlative daring which must be credited to anyone making that uncertain solo flight (proof of the ultimate of self-reliance) is one more of the million evidences which

from time to time have thrust themselves out of the scurry of events demonstrating that anything worth while that can be done by man, woman can do.

By her great achievement, Mrs. Putnam has done far more than she announced in London as that thing which she set out to do—prove the equality of woman in the air. She has done more than that and less than that. She has proved that as a pilot she is the equal of most men. But her flight has not impressed the world with a new idea of the competence of femininity, for the world always has known that femininity is competent. Probably few men dispute the real equality of woman, although usually they declare the ladies are not likely to be quite at their best when they “go up in the air;” that, however, is when the term is given a figurative meaning. Up in the air in a practical sense, Amelia Earhart Putnam showed herself the equal of any man who ever flew a plane. She was beset by difficulties requiring in their solution knowledge, quick thinking and fortitude. She met every one of them magnificently.

## Planes for the Private Owner

**E**NCOURAGING straws showing the way the major currents are blowing in the aeronautical world continue to bob into public view. The truth that the paramount problem of the aviation industry, solution of which spells salvation, is bringing flying down to the common man is surely permeating the world of aeronautical thought and endeavor.

Europe gives increasing evidence that her manufacturers intend to give America a worthy race in producing a plane that will meet the requirements of sending a great part of the population into the air. The ill winds of economic pressure that blow some good may bring the light plane that, for initial cost, upkeep, simplicity of control and safety will give the millions of people who yearn to fly their opportunity.

There is no lasting benefit in dodging the stern economic facts. The aviation industry has not solved its real problem until it has brought its product down to the common purse. The successful and praiseworthy aircraft thus far produced have cost too much, imposing restrictions that are basically restrictive to growth.

With hundreds of thousands of young men and women already inducted into eager study of aeronautics and prevented from flying only by the cost, with a lesser number of middle-aged folk in a similar position, the advent of the “universal plane” at the price of a medium-cost automobile (of course with the factors of safety and simplicity) will see an upward rush of individual flying that now scarcely can be visualized. The task is for the engineers and production managers of our factories.

With a great popular movement toward individual flying will inevitably come in equal ratio increased traffic over the passenger transport lines, which already are showing that sound, firm growth which their value merits. As the safety factor has advanced and been definitely proved, the tide of air passengers has steadily swelled, and will continue to grow. Government subsidy in the form of mail contracts and purchases of aircraft for Army and Navy will be seen as well spent in the public interest when it is shown that the opportunity for research and development has given a plane that is fit truly to serve the whole public.

# FUTURE SUPER-SPEED FLYING

By Dr. Max M. Munk

**A**VIATION enthusiasts sometimes like to dream and look into the future, speculating on the probable trend of airplane design. Whenever this is indulged in, it should be realized that modern aircraft are designed primarily for purposes auxiliary and secondary to forward flight itself. Airplane design is dominated by the requirement of getting off in order to fly and by the even more restraining requirement of bringing the airplane down safely and comfortably at the flight's termination. The flight itself is really the stepchild of the designer; it receives only what attention remains after the problems of starting and landing have had first consideration.

This thought is not new, but it is seldom followed up far enough and the extent of its truth is not realized often enough. It is generally known that if we could dispense with the landing gear of an airplane and could decrease the wing area somewhat, we would obtain an appreciable improvement in speed. But full credit is not given to the magnitude of the beneficial effect and it is not realized how tremendous such gain in speed would be.

Schools teach, and students accept, the theory that drag increases with the square of the speed and the required horsepower increases with the third power of the speed. From such rules it appears as though the decrease of the drag from the elimination of the landing gear and from a reduction of the wing area would soon be absorbed by a moderate increase of the speed. As a matter of fact, the square law and the third-power law are misleading when applied indiscriminately to the present question; such laws hold only for a given and fixed aircraft shape, and not for the comparison between different types of aircraft. A super-airplane, flying with super-speed, would present a picture very different from that of a conventional airplane, and consequently the square and third-power rules are not applicable to a comparison between the two, since they would lead to erroneous results. These laws stress the speed-resisting features of aerodynamics, but they are inadequate in disclosing the speed-inviting side. There are redeeming circumstances which are very favorable to a high speed, and as soon as we go into designing for speed, and ignore for the moment the burdensome requirements of starting and landing, we enter into a field which holds much promise.

In almost every respect each increase of speed aids itself again to prepare the way for a further increase of speed. Many circumstances are favorable for speed—greater speed is desirable for engine cooling, and a smaller fraction of the available horsepower is necessary to provide such cooling; control of the airplane becomes easier, and smaller control surfaces become adequate; propeller efficiency increases with the speed, and the propeller diameter can be reduced with increased velocity of flight without an appreciable reduction of the propeller efficiency. Partly from that reason (as well as from direct aerodynamic considerations of efficiency) the r.p.m. of the propeller can then be increased without undue loss of driving power. In that way the engine can be built more economical, lighter and more compact.

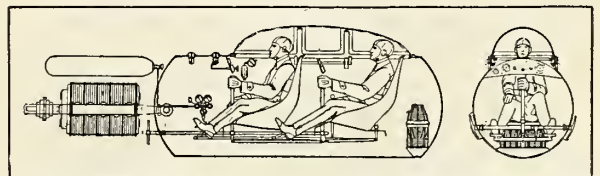
The creation of sufficient lift for sustaining the weight

of the airplane is no longer a problem at high speed, but on the contrary, there will be an excess of lifting capacity. Nor is there then any appreciable horsepower absorbed by creating such lift. The greater speed brings the airplane into contact with a larger volume of air; consequently each particle of air is under the influence of the airplane for a shorter time, and the air yields less under the weight of the plane. If the flying speed could be increased ten times, the vertical velocity with which the air yields under the airplane weight would be reduced that number of times, and hence the kinetic energy of the air, one hundred times.

At speeds which we regard as really high, there remains to be overcome practically only the bare parasite drag of the airplane, and this drag is diminished by all the effects mentioned; control, cooling and lift mechanisms assume dwarfed proportions, and the general type and aspect of the entire aircraft become fundamentally different. It loses much of its present birdlike appearance and approaches the more compact shape of a fish. Its well streamlined body with all wings, fins, drive, and so forth, as relatively small appendages will remind us more of a ship or of an automobile than does the present-day airplane. The principal technical problem is, then, to cut down the drag, which is the main obstacle limiting the attainment of a high flying speed. Since lift is easily obtained at high speed, it is possible further to reduce this drag by ascending to high altitude and into rarefied air, obtaining in that way a further proportional decrease in resistance.

These are only the beginning of the favorable effects of a higher speed on a further increase of the speed. We have not yet given consideration to the natural progress of science and invention. Marked progress would not fail to become evident once we make a start with such a favorable proposition. The only remaining problem of the parasite drag has been immensely simplified by the compactness and smoothness of the shape and by the absence of any unreasonable limitation of the weight. That would give impetus to scientific studies of air motion and drag prevention about which we know almost nothing today except a little about the effect of streamlining. Fundamental knowledge on the subject is still lacking. In all other branches of technology, intelligent scientific studies have led to immense technical improvements. Air motion is certainly another fruitful field in that respect. The possibilities are immense, for there is really no logical necessity for the greater portion of the resistance of solids. In one step, twenty years ago, streamlining reduced the drag

*(Continued on page 76)*



Recently proposed design of a stratoplane's air-tight cabin, conceived by Crocco, Italian exponent of high altitude flying

# DESCRIPTIVE GEOMETRY IN STRUCTURAL ANALYSES

By

Dr. Michael Watter

## Part I

THE common occurrence of space framework in aeronautical structures makes desirable the use of methods which are both clear and expedient for the solution of such trusses. Biplane cellules, externally braced monoplanes, landing gears, float bracing framework, engine mounts, etc., fall within the category of trusses in spaces, and it is the object of this article to present the method of application of standard principles of descriptive geometry in the solution of these problems. In addition to the advantages of compactness of solution, such treatment has a valuable educational value for an engineer, training him to visualize better the interrelation of different parts and members of the structure as well as enabling him to comprehend the true physical behavior of the framework. The graphical treatment of trusses under loads acting in the same plane is well known to engineers and there is no need of reviewing it here. It is also assumed that the reader remembers the laws of conditions of equilibrium and limitations under which may be determined the loads in the members of any structure. The principles of descriptive geometry, however, may have been partly forgotten, and before proceeding with the subject of the article a few theorems will be reviewed here to make clear the workings of what the author calls "the method of rotation."

In addition to the general knowledge of projections, the most important problems of which knowledge is essential in applying descriptive geometry to the solution of trusses in space, are the following:

Projections of lines: (1) Intersecting lines. (2) True length of a line.

Representations of planes: (1) Traces of planes and piercing points. (2) Passing a plane through two intersecting lines. (3) Line of intersection of two given planes. (4) Lines perpendicular to planes.

The limitations of a magazine article do not allow the presentation of detailed proofs and explanations, and only the mechanics of the operations involved will be given here. In what follows we will use three principal projections or views, referred to as coordinate planes F, S and P: Front, side and plan. In certain problems it may be sufficient to utilize only two projections, and in that case one view will be eliminated.

### Intersecting Lines

Since two intersecting lines contain a common point, by virtue of the orthogonal projection, this point is readily located on the perpendicular to the ground line. The ground line for front and plan views is the line of intersection of these two planes, that is, a horizontal line, while

for front and side views it is a vertical line. In figure 1 lines AB and CD intersect at point O, the projection of which indicates the intersection of the projection of lines AB and CD. Were one of the lines contained in the plane perpendicular to the F or P planes, the above construction would have been modified and front and side or plan and side views should have been used.

### True Length of a Line

In the case when a line is not parallel to any of the three coordinate planes, its true length is not given and must be determined. There are three methods which can be used for this purpose: The method of triangles, the use of reference line and the method of rotation. Only the latter will be given here, since it is the most compact and also because of its further general use in this discussion.

Line AB shown in figure 2 is inclined to all coordinate planes and its front and plan projections are given by  $a'b'$  and  $ab$  respectively. In order to obtain the true length of the line AB it is necessary to rotate the trapeze  $aABb$  around  $aA$  until it is parallel to plane F. Since the rotation is taking place about an axis perpendicular to the ground line, all the points in the plane F move parallel to the ground line; that is, horizontally. From figure 2 it is clear that point  $b'$  will assume a new position  $b''$  such that the horizontal distance  $a'b''$  is equal to  $ab$ . The construction, with all the lines necessary to obtain the true length of the line AB, is given in figure 3. The true length is  $a'b''$ .

### Traces of Planes and Piercing Points

It is clear that if any plane inclined to all the three coordinate planes is extended indefinitely it will intersect the coordinate planes. The lines of intersection of the plane with the coordinate planes are called the traces. Figure 4

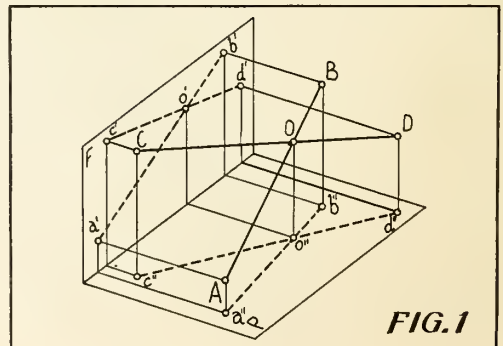


FIG. 1

shows plane XZY and traces XZ, ZY and XY. Continuations of any line in the plane XZY included within the traces will pierce the corresponding plane at the point where it intersects the trace line; for instance, line AB pierces the coordinate plane F at the point A'.

Figure 5 shows the projections of the line AB and traces. Continuing a'b' we find the piercing point A'. If the construction and projections are correct, continuing the projection a''b'' we intersect the ground line at a<sub>x</sub> so that joining A' with a<sub>x</sub> we obtain line A'a<sub>x</sub> perpendicular to the ground line X.

**Passing a Plane Through Two Intersecting Lines**

Since only one plane can be passed through two intersecting lines, it is necessary only to find the piercing points of each line and planes F, P and S in order to draw the traces defining the plane. Figures 6 and 7 show the construction involved. Continuing a'b' and c'd' until they intersect the ground line X, and projecting these points on a''b'' and c''d'', we find the trace of the plane on P. Continuing c''d'', we find the projection at the piercing point of CD with F. Projecting this point on c'd' and joining the point thus obtained with the point of intersection of the trace on plane P and ground line X, we obtain the trace on plane F.

**The Line of Intersection of Two Planes**

Determination of the line of intersection of two planes at times involves auxiliary construction, and to illustrate the problem, two extreme cases will be given here. Inasmuch as the line of intersection of two planes is common to both planes, its piercing points with coordinate planes are common with traces. The above is the fundamental rule for finding the line of intersection, since once the piercing points are determined it is easy to draw the projection of the intersecting line. Figure 8 illustrates the method when the points of intersection of the traces are within the limits of the drawing. Given two planes defined by their traces Mm, Mm' and Nn, Nn' respectively. Since the F traces intersect at a', a' is the piercing point of the lines of intersection and the coordinate plane F. The piercing point with the plane P is in b. Therefore, by project-

ing b and a' on the ground line X, we obtain points a<sub>x</sub> and b<sub>x</sub>, which, when joined with a' and b respectively, give the two projections of the intersection line of planes M and N.

Figure 9 gives the construction involved when one of the points of intersection of traces is outside the limits of the drawing.

Introduce a third plane O, parallel to F plane. Its trace line will be parallel to ground line X and in figure 9 it is indicated as co. The intersection of this new plane with plane M will be projected on plane F as a line parallel to Mm' (line c<sub>x</sub>o') while with the plane N its intersection will give a line parallel to the trace Nn' (line b<sub>x</sub>o'). Point O is evidently common to all three planes and consequently is on the intersecting line of planes M and N. By joining a<sub>x</sub> with o and a' with o' we find the projections of the desired line of intersection of two given planes.

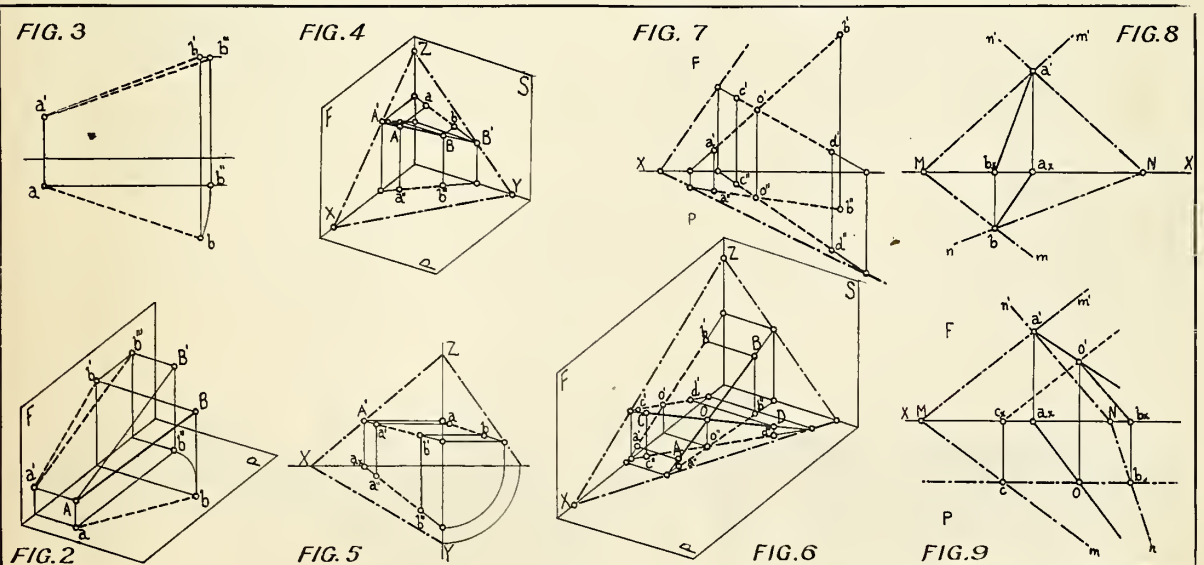
**Lines Perpendicular to Planes**

It can be proved that if a line is perpendicular to a plane its projections are perpendicular to the traces of that plane on coordinate planes F, P and S. The proof is done by constructing auxiliary planes perpendicular to coordinate planes and containing the line in question.

The latter theorem, while not of importance in finding loads in members of trusses in space, is extremely useful when dealing with problems involving bending and torsion, and also because of its suitability to drafting room application.

**Method of Rotation Applied to Space Framework**

Having reviewed briefly the necessary principles of descriptive geometry, we may now pass to constructions involved in solution of space framework. The problems met with in practice are numerous but the five examples which follow present a sufficient variety of conditions that once the method is understood, further applications will be found comparatively simple. The general method of attack is either to resolve or to combine the outside acting loads in the most convenient way and to find a plane which contains the resultant or some of the forces and one of the members. Having found the intersection of this plane with



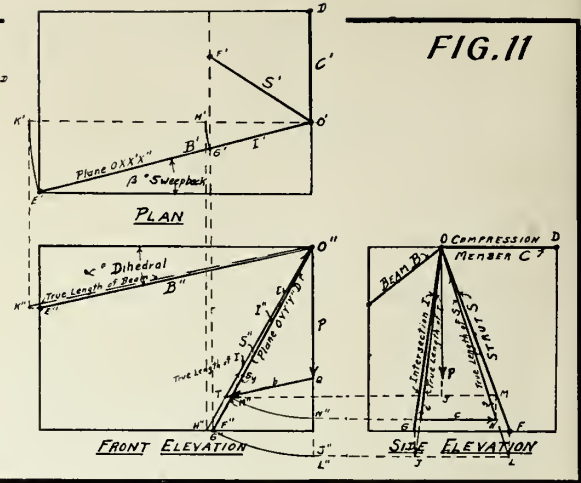
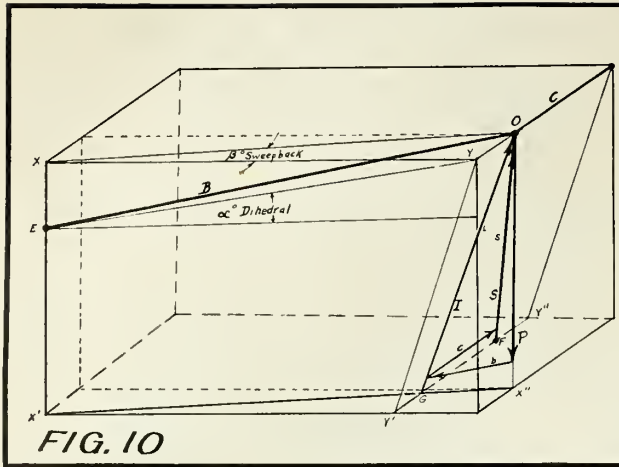


FIG. 11

the plane containing the two other members, it is then possible to resolve the outside load into the direction of the member and the line of intersection.

The component in the member gives the load in it while the component in the plane of two other members is then resolved between the two members in that plane, thus obtaining the loads in these members.

**Wings**

The following graphical solution was originally done in connection with a Least Work analysis of a biplane wing cell truss in the nose dive condition. This particular wing truss is very nearly a general case in that there is a sweepback in the upper wing and dihedral in both upper and lower wings. The front landing wire and the rear lift wire are assumed to be in action. In the determination of Po (loads in members with redundant parts not acting), the diagonal strut and the rear landing wire were the two redundant members chosen and were thus left out in this solution. Notations used are: B for the beam, C for the compression member, S for the interplane strut, P for the applied load.

The wing truss is a space framework since all its members do not lie in the same plane. In the following discussion a three-dimensional solution in an isometric sketch is made, so that the necessary steps may be more readily visualized. True lengths of lines are, of course, impossible in such a sketch. In order then to obtain true lengths of lines and to keep within the two-dimensional limits of paper, the "method of rotation" is employed to bring the various lines into the plane of the paper.

The actual solution in each case is made in the three-view sketch, the members lying out of the plane of the paper being rotated into it where their true lengths and the true lengths of the loads in them can be scaled directly.

In the discussion which follows, isometric and actual two-dimensional solutions are made for each interplane strut point. Similar solutions may be made for any flying or landing condition.

**Upper Front Strut Point**

At the upper front strut point O (see figure 10) are a compression member C, a beam B, a strut S and a vertical load P. Pass a plane OXX'X'' thru B and P as follows: Project point E to X on upper face and X' on lower face

of cube; prolong OP to X'' on lower face and draw X'X'' and XO, thus obtaining plane thru B and P. Pass a plane OYY'Y''D thru C and S as follows: Project O to Y on front face and D on rear face; project F to Y' on front face and Y'' on rear face; draw YD, DY'', Y'Y'' and Y'Y, thus obtaining plane thru C and S. The intersection of these two planes is OG or I. In plane OXX'X'' resolve P into a component along I equal to i and a component parallel to B equal to b, giving the true load i in the intersection and b the true load in the upper front beam.

In plane OYY'Y''D resolve i into a component along S equal to s and a component parallel to C equal to c, giving the true load s in the front strut and c the true load in the compression member.

The actual two-dimensional solution is illustrated in figure 11 for this strut point. The various planes and lines are rotated to bring them into the plane of the paper. The rotation locating the various points and lines in the isometric sketch is also used in this three-view sketch. In plan view, plane OXX'X'' (containing B' and I') is rotated so that the true lengths may be obtained in the front elevation view; that is, in plan, O'G' is rotated to position O'H', and O'E' is rotated to position O'K'; H' and K' are projected into the front elevation to position H'' and K'' respectively, which are the intersections with lines drawn horizontally from G'' and E'' respectively; O''K'' is the true length of beam B and O''H'' is the true length of the intersection I. P is resolved into a component O''T along O''H'' equal to i and a component QT parallel to O''K'' equal to b, giving i the true load in the intersection and b the true load in the beam.

In front elevation, plane OYY'Y''D (containing I'' and S'') is rotated to a vertical position so that the true lengths may be obtained in the side elevation; that is, in front elevation G'' and F'' are rotated around O'' to position J'' and L''; J'' and L'' are projected into side elevation to positions J and L respectively, which are the intersections with lines drawn vertically from G and F respectively; OJ is the true length of I and OL is the true length of S. True load i (from front elevation) is scaled off on OJ (from O) and resolved into a component along OL equal to s and a component parallel to C equal to c giving the true load s in the front strut and the true load c in the compression member.

(To be continued in the July issue)

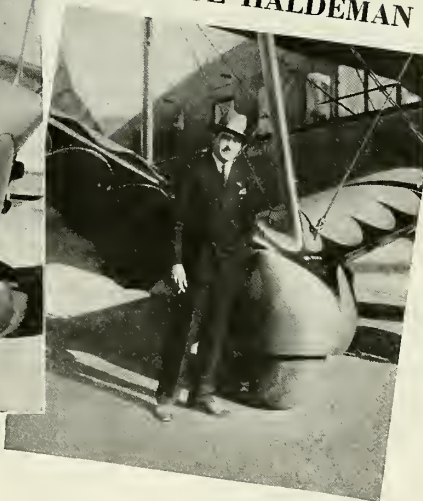


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Lindbergh's early-morning take-off on his flight to Paris and Chamberlin's take-off for Germany

(Acme photos)

## FIVE YEARS AGO

**M**AY and June of this year mark the fifth anniversary of four trans-ocean flights that aroused the world to aeronautical activity. Lindbergh's daring solo flight of 3,600 miles from New York to Paris, in thirty-three and one-half hours on May 20th-21st, was followed closely by Chamberlin's flight with a passenger from New York to Germany, a distance of about 3,900 miles, on June 4th and 5th. Before the month had passed, Lieutenants Maitland and Hegenberger flew their Army plane from the coast of California across the Pacific to Hawaii, on June 28th and 29th, a distance of 2,400 miles, in a little less than 26 hours. On June 29th Commander Byrd and his crew of three took off from New York for Paris and after a forty-hour flight of about 4,200 miles, were forced to land in the fog on the coast of France.

These four outstanding flights were really the beginning of public interest in aviation's possibilities. Each of these flights brought out a story that will live in aeronautical history. A brief resume of these pioneering ventures gives an idea of the difficulties met by the trans-ocean pilots of 1927.

In reality Colonel Lindbergh's flight started at San Diego, California, whence he took off for St. Louis in his Wright Whirlwind-powered Ryan monoplane, *Spirit of St. Louis*, on May 10th, at 3:55 p. m. Reaching St. Louis in a little less than fourteen hours, he left later the same day for New York, completing the cross-continent flight in 21 hours, 45 minutes, thereby establishing a coast-to-coast record for that year. Delayed in New York for eight days by unfavorable weather reports, the *Spirit of St. Louis* took off from Roosevelt Field at 7:52 on the morning of May 20th. After leaving Long Island, the ship was out of sight of land until St. Johns, Newfoundland, was reached. There Lindbergh flew over the city, in order to check his bearings. He then headed for the open sea as night came on. Climbing over some of the storm clouds and under others, he succeeded in getting rid of the dangerous ice that formed on the wings of his ship. Late in the afternoon of the following day he sighted the coast

of Ireland, after passing over some fishing vessels lying off-shore. Cheered by the knowledge that accurate navigation had brought him within three miles of the point for which his course was set, he headed for Paris. At 10:21 p. m., Paris time (5:21 New York time), he landed at Le Bourget, amid the most tumultuous reception ever conferred on one young man—the first of a series which marked his visits to European capitals and his triumphant return to this country. The flight, completed in 33 hours, 29 minutes, 30 seconds, established a record as the only solo crossing of the North Atlantic to a predetermined destination.

On June 4th, just two weeks after the completion of Lindbergh's flight, Clarence Chamberlin, carrying a passenger in his Bellanca, *Columbia*, started for a distance flight to Europe—destination unannounced. Leaving Roosevelt Field at 6:05 a. m., the ship was reported at various points along the coast until it passed beyond Wedge Island, Nova Scotia, after which the first persons to sight it were the passengers aboard the *Mauretania*, some 360 miles west of the Scilly Islands. Late Sunday afternoon, June 5th, the *Columbia* crossed over southern England, en route for Germany. On June 6th, at 12:35 a. m., New York time, the gasoline supply being exhausted, Chamberlin brought the plane to earth at Eisleben, Germany—a distance of 3,923 miles from New York. The Wright Whirlwind engine had been functioning perfectly, so after refueling, Chamberlin took off again, landed at Kottbus and then flew to Berlin, his original destination.

Meanwhile, the trans-Atlantic flights had stirred the ambition of many pilots to cross the Pacific. Before any civilian fliers attempted this flight, however, the Army detailed Lieutenants Lester Maitland and Albert Hegenberger to make the flight. Making a perfect take-off with its heavy load of 14,500 gallons of gasoline, the big Army Fokker, with its three Wright Whirlwind engines, left Oakland Airport at 7:09 a. m., Pacific time. Passing over the Golden Gate, it soon outdistanced its escort of Army

(Continued on page 87)



(Acme photos)

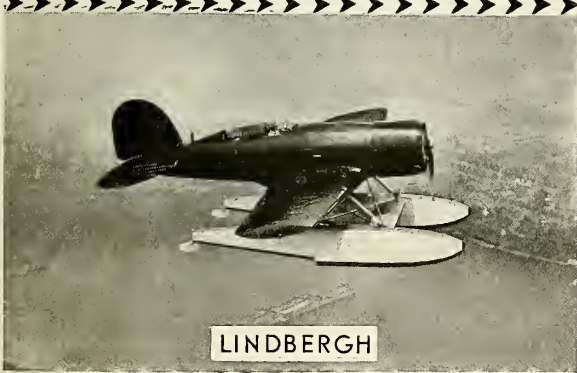
Commander Byrd's take-off for France and Lieuts. Maitland and Hegenberger's plane en route to Hawaii

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- Goebel-Davis . . . . . Oakland to Honolulu
- Jensen-Schluter . . . . . Oakland to Honolulu
- Brock-Schlee . . . . . Detroit to Tokio
- Wilkins-Eielson . . . . . Alaska to Spitzbergen
- Kingsford-Smith . . . . . Around the World (Westward)
- Earhart-Stultz . . . . . Newfoundland to Wales
- Williams-Yancey . . . . . Maine to Rome
- Admiral Richard E. Byrd . . . . . Over the South Pole
- Boyd-Connor . . . . . Canada to England
- Colonel and Mrs. Lindbergh . . . . . Washington, D. C. to Tokio
- Captain Frank Hawks . . . . . American and European Speed Records
- Hoiris-Hillig . . . . . Newfoundland to Germany
- Boardman-Polando . . . . . New York to Istanbul
- Reichers (High-Speed Flight) . . . . . New York to Irish Coast
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**M**AY 20-21, 1932, was the Fifth Anniversary of Lindbergh's non-stop flight from New York to Paris. Since that memorable event, Wright Engines have powered more famous flights than all other engines combined.

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# AIRLINES AND AIR TRAVEL

## Airlines Report for First Quarter

REPORTS for March from more than thirty airlines bring the total Department of Commerce figures for air transport operations for the first quarter of 1932 to new levels, with the exception of air mail. The comparative statistics on operations for the first quarters of 1931 and 1932 are as follows:

	1931	1932	Increase
Miles scheduled.....	8,375,314	13,317,116	59%
Miles flown.....	7,427,641	11,359,978	53%
Air mail.....	2,158,918	2,073,338	-4%
Passengers.....	66,399	86,763	31%
Passenger miles.....	15,692,357	22,555,392	43%
Air express.....	209,004	283,626	36%
Gasoline.....	3,141,900	4,535,422	44%
Oil.....	84,038	133,013	58%

## T. W. A. Reports Active Southwest

AIR transportation throughout the entire Southwest is gaining, according to a report made by H. W. Beck, traffic manager for Transcontinental and Western Air, Inc. Great increases in coast-to-coast travel are indicated at numerous points, reflecting improvement in general business conditions.

The western region, extending from San Francisco via Los Angeles to Kansas City, shows an increase of forty-two per cent for April of 1932 over the previous month, the report declares. A gain of fourteen per cent is found for April, 1932, over April, 1931. Northern California records an increase of 304 per cent for April over March, and 515 per cent for April of this year over April of last year. The city of San Francisco traffic increased 294 per cent for April over March, and 771 per cent for April, 1932, over April, 1931. Oakland's gains were 409 per cent for April over March and 112 per cent for April of this year over the same month a year ago.

Southern California fails to present such spectacular increases, but in view of the fact that this area built up amazing records last year, the current report shows excellent business, Mr. Beck stated. His report states that Southern California developed a thirty-nine per cent increase for April over March, and the month was slightly better than April a year ago, which was a record-breaker. The downtown city ticket offices are slightly greater for both comparisons. Hollywood holds the high record for the South, increasing 111 per cent for April over March and 107 per cent for April, 1932, over April, 1931.

## American Airways Continues Gain

LAMOTTE T. COHU, president of American Airways, Inc., announced last month that planes of his line flew 872,516 miles in scheduled transport service in April and carried 8,636

passengers and 132,431 pounds of mail.

The figures for the first four months of 1932 as against 1931 are as follows:

	1931	1932	Increase
Miles flown.....	2,153,086	3,261,106	51.5%
Passengers carried..	9,737	13,338	88.2%
Lbs. mail carried...	458,336	491,996	7.3%

## Aid North-South Air Travel

INTERLINE ticket arrangements were completed recently between American Airways, Inc., and Pan-American Airways to open the entire western hemisphere, from Montreal to Buenos Aires, to air travel over continuous lines. At any one of 4,000 ticket offices it is now possible to buy direct air transportation between any points in the United States, West Indies, Mexico, Central and South America.

## Planes and Buses Cooperate

AN agreement for mutual cooperation between the Greyhound Bus Lines and the Eastern Air Transport System became effective recently. The agreement brings two of the youngest and fastest growing modes of transportation together for the development of traffic along the Atlantic Seaboard. Many cities not directly served with air transportation are given rapid connections to the nearest airport of call, and each of the twenty-seven cities served by the Eastern Air Transport System is a key point in serving all centers of population within a radius of 100 or more miles.

The agreement provides that each company act as agent for the other, that joint traffic promotion be done, joint schedules and traffics issued and bus schedules coordinated with those of the transport planes so that a mutual exchange of passengers may take place wherever possible.

## Ludington Tries Fares Experiment

AN experiment in "student" or excursion class tickets at the lowest air passenger fares on record was instituted recently by the Ludington Lines. Although the period of experimentation was scheduled to expire June 1, it was announced at the company offices that the sale of the special tickets might be revived in the future.

Sold on a space-available basis, the tickets were obtainable at a rate of five dollars between New York and Washington. The holder was required to wait at the airport until just previous to the take-off on the plane. If a seat remained vacant after first-class reservations had been filled, it was assigned to him. If the plane was sold out, the passenger had to wait one hour for the next plane.

## American Airways Divisions Unite

CONSOLIDATION of the Colonial and Central divisions of American Airways, Inc., centers nearly two-thirds of the company's operation in St. Louis, making the city the headquarters for the largest air transport unit in the United States administered from one point. Only the Southern Division will continue to be operated as a separate unit.

The Colonial Division was the company's eastern unit, operating throughout the East and into Canada and serving New York, Boston, Cleveland, Buffalo, Rochester, Syracuse, Utica, Albany, Hartford and Montreal. The Central Division was formed in March through the merger of the Universal Division, operated out of St. Louis, and the Embry-Riddle Division, which had headquarters at Cincinnati. Col. Halsey Dunwoody, vice-president of the company, who was in charge of the Universal and later of the Central Division, is the head of the newly consolidated division.

The merger is one of several important changes and expansions American Airways has made in the last two months with St. Louis as the focal point. The company recently instituted a new night route to Omaha, which was followed by the acquisition of the Century Line's route to Chicago and the institution of a new service to Evansville and Louisville, consisting of a round trip daily among the three cities.

## Change Southern Air Headquarters

THE Dallas, Tex., base of American Airways, Inc., is the new operating headquarters for the southern halves of two north-south lines, company officials announced. Heretofore the Chicago-New Orleans and the Cleveland-Fort Worth lines have been operated entirely from the St. Louis headquarters. On May 1 the St. Louis-New Orleans and Nashville-Fort Worth divisions of these routes were put under the control of Dallas operatives.

## Union Ticket Office Busy

AIR travelers from the San Francisco business and financial district are now served by the Air Lines Consolidated Ticket Office recently opened on the ground floor at 315 Montgomery Street. This office is a branch of the Consolidated office which was established in Los Angeles about a year ago and is under the management of D. W. Grant. He reports that ticket sales for all airlines operating out of the San Francisco Bay Airdrome have greatly exceeded sales of tickets in their Los Angeles office during its first month of existence. (Continued on following page)

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- CALIFORNIA**  
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Denver, Western Flying Service
- CONNECTICUT**  
South Meriden, Meriden Aircraft Corp.
- DELAWARE**  
New Castle, Air Service, Inc.
- FLORIDA**  
Lakeland, Otis H. Ashley
- ILLINOIS**  
Northbrook, Sky Harbor, Inc.  
Quincy, Inelcities Airlines  
Springfield, Springfield Aviation Co.
- INDIANA**  
Indianapolis, Central Aeronautical Corp.
- IOWA**  
Cedar Rapids, Cedar Rapids Airways, Inc.
- KANSAS**  
Kansas City, Ben F. Gregory
- KENTUCKY**  
Louisville, Robert Duckworth, Jr.
- MASSACHUSETTS**  
Leominster, Fitchburg & Leominster Airways
- MICHIGAN**  
Battle Creek, Duplex Air Service  
Detroit, Wm. B. Maycock  
Detroit, Earl Spitz Flying Service  
Grand Rapids, Furniture Capital Air Service  
Midland, Jack Barstow
- MINNESOTA**  
Minneapolis, Freeman Aircraft Sales, Inc.
- MISSOURI**  
Kansas City, Tuxhorn Flying School, Inc.
- NEBRASKA**  
Omaha, Enzinger Aircraft Sales Co.
- NEW HAMPSHIRE**  
Manchester, Northeast Airways
- NEW JERSEY**  
Hasbrouck Heights, New Standard Flying Service, Inc.
- NEW YORK**  
LeRoy, D-W Flying Service, Inc.  
New York City, Geo. M. Pyncheon, Jr. Inc.  
Oneonta, Georgia Airways  
Schenectady, Intercities Airways Service, Inc.  
Watertown, F. H. Taylor, Inc.
- NORTH DAKOTA**  
Oakes, A. O. Foster  
Williston, Canfield Flying Service, Inc.
- OHIO**  
Dayton, Moore Flying Service  
Sandusky, Parker Brothers Airways
- OKLAHOMA**  
Tulsa, D. A. McIntyre
- OREGON**  
Portland, Portland Airways, Inc.
- PENNSYLVANIA**  
Duncansville, Paul Peterson  
Fairview, McCray Air College
- TENNESSEE**  
Johnson City, Appalachian Flying Serv., Inc.  
Memphis, Mid-South Airways, Inc.  
Knoxville, Knoxville Aero Corporation
- TEXAS**  
Dallas, Dallas Aviation School
- VERMONT**  
Brattleboro, Reed Whitney Flying Serv., Inc.
- VIRGINIA**  
Chalottesville, Dixie Flying Service, Inc.  
Roanoke, Reynolds Flying Service
- WEST VIRGINIA**  
Charleston, West Virginia Airways, Inc.  
Fairmont, Reed Flying Service, Inc.  
White Sulphur Springs, White Sulphur Springs Flying Service, Inc.
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**STINSON AIR CAB OPERATORS' ASSOCIATION**  
WAYNE, MICHIGAN

(Continued from preceding page)

#### **Pan American Shows Heavy Traffic**

**A**VERAGING more than 1,000 passengers weekly over its international airlines to the West Indies, Central and South America, the Pan American Airways System carried a total of 14,012 passengers during the first three months of 1932, according to the regular quarterly traffic reports issued recently. This figure compares with 12,862 passengers for the same period a year ago. Passenger miles flown during the three months totaled 4,375,569, an increase of approximately 1,000,000 passenger miles over those for the corresponding quarter of 1931.

These figures place the Pan American Airways System as the heaviest carrier of passengers of all airlines in the world, exceeding by a wide margin the volume reported for Imperial Airways of Great Britain, Aeropostale of France or the Deutsche Luft Hansa of Germany. Compared with the domestic air mail lines operating within the United States, the passenger volume carried by Pan American Airways is equivalent to slightly more than twenty-one per cent of the total carried, and the passenger miles flown equal nearly twenty-nine per cent of the total reported by the twenty-three domestic air mail lines combined.

Air mail cargo showed corresponding increases, with a total of 647,838 pounds, approximately 324 tons, for the period, an increase of 70,133 pounds over the first quarter of 1931.

#### **Pilots Exceed 10,000 Flying Hours**

**F**IVE licensed transport pilots, including Clyde Pangborn of long-distance flying fame, have reported to the Aeronautics Branch of the Department of Commerce that they have flown more than 10,000 hours each. There are 286 transport pilots who have credit for more than 5,000 each, including these five men. The five are E. Hamilton Lee of Omaha, Neb.; James H. Knight of Chicago, Ill.; Clyde Pangborn of Wenatchee, Wash.; Ralph F. Thomas of Akron, Ohio, and Edwin K. Jaquith of New York City.

The number of transport pilots who have flown more than 10,000 hours is approximately one-tenth of one per cent of the total of licensed pilots in this grade. Twenty-five per cent of the transport pilots are credited with 200 to 500 hours each, and twenty-three per cent have flown 501 to 1,000 hours each. The total number of licensed transport pilots is 6,929. A study made of flying by transport pilots during 1931 showed that they flew a total of 1,558,515 hours.

#### **New American Airways Mail Official**

**C**LARENCE E. FLEMING of Kansas City, Mo., has been appointed

mail traffic manager of American Airways, Inc., according to President Lamotte T. Cohn. Mr. Fleming has been connected with aviation since January 1, 1926, and is believed to be one of the oldest traffic employees of the air transport lines in point of continuous service.

#### **United Appoints Traffic Man**

**M.** MARTIN has been appointed traffic representative of United Air Lines, with headquarters at the San Francisco Bay Airdrome, Alameda. He was formerly night traffic man for the company at Oakland Airport.

#### **T. W. A. Begins New Service**

**A** NEW sunset service to Philadelphia, Harrisburg and Pittsburgh has been inaugurated by Transcontinental & Western Air, Inc. The new plane, "The Pittsburgher," leaves Newark Airport at 4 p. m., standard time, arriving in Philadelphia at 4:45; Harrisburg, at 5:47, and Pittsburgh, at 7:33 p. m.

#### **Radio Airway Chart**

**R**OBERT J. RENTZ, terminal manager for American Airways, Inc., at Chicago airport, has developed a radio dispatch board that is the first of its type in the world. The device has proved so valuable that he is designing a larger and more comprehensive one for use in the operations office.

The board is an outline map of Illinois, Indiana and part of Ohio, with routes of American Airways out of Chicago superimposed. Along these routes are placed small light bulbs, green on one side of the route and red on the other. At regular intervals are white lights, located at terminal points or where there are radio stations operated by the system.

Pilots of American Airways planes are in constant communication with ground stations along the routes by radio telephone. Every ten minutes they report their positions. The radio telephone operator in the Chicago office notes each report and plugs in a key, which lights the bulb on the board marking the reporting plane's approximate position.

By means of the radio control, employees in the operations office of the system can see at a glance at any time how many planes are en route in each direction and can determine their relative positions.

#### **Pan American Lowers Summer Rates**

**U**NDERGRADUATE university students and teachers will be offered forty per cent reductions this summer in fares for air cruises over Mexico and Central and South America, according to an announcement made last month by Pan American Airways System.

#### **United Shows Gain**

**D**URING the first quarter of this year United Air Lines increased its passenger revenue seventy-seven per cent over the first quarter of 1931. In April it registered a forty-seven per cent gain in revenue passengers over March and an increase of 150 per cent over passengers carried in April, 1931. The figures were: April of this year, 6,885 passengers; March, 4,668 passengers.

United Air Lines on May 7 flew its forty millionth mile, the first airline in the world to attain that figure.

#### **Extend Oklahoma Service**

**I**NCREASED air mail passenger service between Tulsa and Oklahoma City, Okla., offering two round trips daily instead of one over the route, were put into effect May 15 by the United Airlines under plans revealed May 2. Under the new schedules, Oklahoma City is eliminated from the Kansas City-Dallas route, and a connecting service between Tulsa and Oklahoma City is substituted.

The new plane schedules departures from Tulsa for Oklahoma City at 1:05 p. m. and 4:55 p. m., with take-offs from Oklahoma City for Tulsa at 11:40 a. m. and 3:30 p. m. Slight changes also are made in the Chicago-Dallas service, with arrival at Dallas from Chicago at 7:45 p. m. instead of 8:18 p. m. The planes on the northbound trip leave Fort Worth at 10:20 a. m. and Dallas at 10:45 a. m., with arrival in Chicago at 6:52 p. m.

#### **W. A. E. Pilots Learn Blind Flying**

**A** STEARMAN mail plane of the Western Air Express has been equipped for blind flying with instruments and hooded cockpit. All pilots on the Pacific Coast division have completed blind flying instruction, and the Stearman has been flown to Cheyenne by L. D. Carlson, where instructions will be given pilots of the Rocky Mountain division.

#### **Ohio Airways Group Formed**

**I**NCORPORATION papers have been issued by the Secretary of State to the Marion Airways, Inc., Marion, Ohio. The company has a capital of \$5,000. The incorporators are L. E. Foreman, A. S. Herr and T. J. Hill.

#### **Minnesota Lakes Service**

**T**HE Atwood-O'Hara Air Service, of which Henry O'Hara is chief pilot, will operate a six-place Ryan, equipped with Edo floats, from the seaplane base on Minnesota Point at Duluth for passenger hopping and taxi trips to the lakes in the Arrowhead region. This service will be in addition to the flying school and other activities being carried on at the Williamson-Johnson municipal airport.

(Continued on following page)



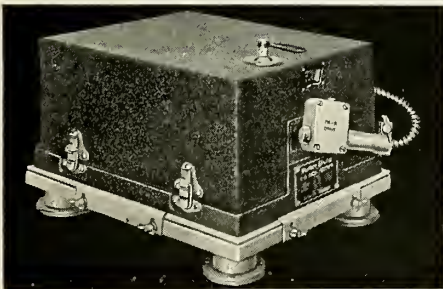
# ... 2-way Radio Telephone for YOU!

*Light, compact, dependable*

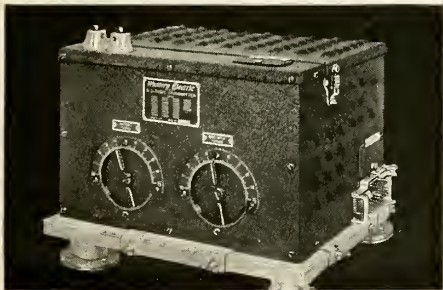
Now you can fly as the transport pilot flies — with Western Electric two-way radio telephone to aid you. Radio beacon signals, weather reports, landing instructions enable you to fly with new confidence.

Western Electric—whose aviation equipment is standard on all the major airlines of the country—makes receiving and transmitting apparatus specially designed for private planes... and transmitters for airport use in communicating with them. You can install your receiving outfit first (weight 30 lbs.) and add transmitting apparatus later to give you the two-way radio telephone system (weight about 65 lbs. complete). All equipment is compact, easily installed, accessible and thoroughly flight-tested.

For full information, address Western Electric Company, Dept. 272 AD, 195 Broadway, New York.



No. 9D receiver — standard for receiving Department of Commerce weather broadcasts and radio range signals.



No. 11A aircraft transmitter — little brother of the apparatus used on all the leading airlines.

**Airport operators!**  
More and more private flyers are using Western Electric — it will pay you to give them full cooperation via radio telephone. Install the Western Electric No. 10A transmitter!

# Western Electric\*

## Aviation Communication Systems

MADE BY THE MAKERS



OF BELL TELEPHONES

\*Northern Electric in Canada

(Continued from preceding page)

#### New Transport Pilot Ratings

**E**STABLISHMENT of a Scheduled Air Transport Rating by the Department of Commerce for all aircraft pilots flying in scheduled interstate air passenger transportation is provided for under an amendment to the Air Commerce Regulations announced recently by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. The amendment became effective May 5, and after the first of next year it will be mandatory on all scheduled interstate air passenger lines.

Indirectly the rating carries with it the requirement that all aircraft employed in scheduled interstate air passenger service be equipped with all types of instruments necessary for instrument flying.

The requirements to be met by an interstate line pilot for the rating include the following:

He shall have had at least 1,200 hours of certified solo flying time, acquired within eight years previous to the date of application for the rating. At least 500 hours of this time shall have been cross-country flying. He shall have had seventy-five or more hours of night flying experience, at least half of which required the use of lighted airways. He shall be capable of flying entirely by instruments in straight, level flight, in moderate banks, minimum glides and maximum climbs, climbing turns and recovery from stalls, skids, slips, spirals and banks, and shall demonstrate this ability by performing the maneuver while in a hooded cockpit and accompanied by a Department of Commerce inspector.

#### New Co-Pilot Regulations

**A**n amendment to the Air Commerce Regulations, specifying that where a co-pilot is required in scheduled interstate air passenger service by Department of Commerce Regulations, such a co-pilot shall hold a Transport Pilot license, and also setting forth a method whereby pilots and co-pilots of scheduled airline operations may log flight time, was announced last month by Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

Where operation of a scheduled interstate air passenger line does not require a co-pilot but the operating company desires to carry one, such a co-pilot may hold a Limited Commercial license. Under conditions where a co-pilot holding a Transport license is required, Col. Young said, such co-pilot or radio operator may serve as steward or cabin attendant.

The amendment enables the pilot in command to receive credit for the total actual flight time, even though he may

have operated the controls only a small portion of a trip. Under the old requirements, the pilot in command of an aircraft could log only that portion of the time during which he was manipulating the controls. A co-pilot holding a Transport license, may log fifty per cent of the total actual flight time or the full time during which he was the sole manipulator of the controls. If that should be in excess of fifty per cent, the total time thus flown shall be certified by the chief pilot.

Where the holder of a Limited Commercial license is officially permitted to function as co-pilot, he may log the time during which he was sole manipulator of the controls while so engaged. However, he may not log in excess of twenty-five per cent of the total actual flight time and the time so logged shall be certified by the first pilot.

#### United Officials Exchange Posts

**T**HOMAS WOLFE of Chicago has succeeded M. F. Redfern as district traffic manager for United Air Lines at Kansas City. Mr. Redfern, who has been located at Kansas City for three years, has been transferred to Chicago to fill the vacancy created by Mr. Wolfe's transfer.

#### To Start Idaho Airline

**E**D C. ROSE and Marion L. Bales have announced plans to establish air passenger routes out of Lewiston, Ida., and also to start an aviation school at the newly acquired Lewiston airport.

#### Maryland Airline Planned

**C**HESAPEAKE AIR FERRIES, INC., of Easton, Md., recently organized to engage in the air transportation business in Maryland, plans to establish an airline between Baltimore and Easton, Md., with Logan Field, Baltimore, and Tred Avon Airport, Easton, as the terminals. An automobile service is planned for the Tred Avon Airport to Easton. The concern recently was chartered with a capitalization of \$10,000.

#### Radio Equipment for W. A. E.

**O**FFICIALS of Western Air Express, United Airport, Burbank, Calif., announce the expenditure of \$30,000 in radio equipment on their Rocky Mountain division, serving El Paso, Amarillo, Albuquerque, Colorado Springs, Pueblo and Denver. Complete installation on all ships, with two-way regulation Western Electric, ten-watt transmitters and receivers, will be completed within two weeks.

#### American Airways Elects Director

**R**OBERT A. LOVETT, a partner in the firm of Brown Brothers-Harriman Co., was elected last month to the board of directors of American Airways, Inc., to fill an existing vacancy.

#### Western Air Express Traffic Grows

**H**ARRIS M. HANSHUE, president and general manager of Western Air Express, reports the carrying of as many passengers the first four months of this year as were carried the first nine months of 1931.

Air traffic over the Pacific Coast and Rocky Mountain divisions for the first four months of this year totaled 1,371. Only 1,364 persons had flown over the two divisions at the end of September, 1931. Traffic for the four months this year as compared with the same period last year showed an increase of 236 per cent. April traffic totaled 430 over both routes this year, as compared with 130 a year ago and 398 in March, this year.

Mr. Hanshue revealed that most of the travel is transcontinental. His report showed that 1,168, or eighty-five per cent of the passenger traffic, was on the Coast-To-Coast Limited of Western Air Express, connecting Southern California with the East in a twenty and twenty-seven-hour service in conjunction with United States Air Lines.

The passenger-mail planes transported 3,305 pounds of express during the four months as compared to 2,564 pounds last year, a gain of 741 pounds. Drastic reduction in air express rates January 1 was said to be responsible for the gain.

#### Hostesses Complete Long Flights

**M**ISS BEULAH UNRUH, senior flying hostess for Eastern Air Transport, had flown 174,000 miles in the airliners of the company by the beginning of last month. Her routine carries her on flights from New York to Washington, Atlanta, Jacksonville and other cities. Two other flying hostesses also have long records. Miss Madeline Moon has flown 152,000 miles, and Miss Marion Cook, 144,000.

#### N. A. T. Celebrates Anniversary

**N**ATIONAL AIR TRANSPORT, subsidiary of United Air Lines, observed its sixth birthday May 12 simultaneous with the flying of its fifteen millionth mile. It was the first American company founded for the purpose of carrying the mails by air.

#### Speed Air Mail for South

AIR mail to Miami, the West Indies, Central and South America will be speeded up through a change of schedules June 1. The new schedules from New York will be as follows: Twelve hours and fifty minutes to Miami, Fla.; to Havana, Cuba, 17½ hours; to Barranquilla, Colombia, 1½ days; to the Canal Zone, two days; to Lima, Peru, four days; to Buenos Aires and Rio de Janeiro, seven days. New York gains one day under the new schedules.



# Facing such Conditions



STEARMAN AIRCRAFT COMPANY supplied one of the nation's largest airlines recently with twelve of these Stearman Senior Speedmail planes. Goodrich Low Pressure Tires, of course.

## ...they had to be Goodrich

"RECENTLY the engineering department of one of the largest transcontinental airlines wrote 'Low Pressure' tires into the specifications accompanying their initial order for 12 Stearman Senior Speedmails," Mr. J. E. Schaefer, Vice President and General Manager of The Stearman Aircraft Company, told us.

"Our own engineering department set out to select tires that would meet the manifold operating conditions imposed on aircraft flying from the East Coast of the United States to the West, and from the Canadian border to the Gulf . . . conditions implying frozen fields at one terminus, soggy fields at another and dry dusty fields at others, all within one scheduled flight. These planes are heavily

loaded, too, and batter all kinds of weather — the landing gears and all pertinent accessories on them must be the best.

"Goodrich Low Pressure Tires met



all specifications and requirements. The inclusion of Goodrich Low Pressure equipment on Stearman Senior Speedmails was, therefore, a natural consequence."

In any size Goodrich Low Pressure Tires afford the highest quality with minimum weight. On any plane they make take-offs and landings safer and easier. That is why more pilots choose Goodrich Low Pressure Airplane Tires than all the other makes put together.

A set of Goodrich Low Pressure Tires can be easily and quickly installed on your plane, with or without brakes. See your nearest Goodrich distributor, or write to the Aeronautical Division of The B. F. Goodrich Rubber Company, Akron, Ohio, or Los Angeles, California.

GOODRICH TAIL WHEELS, too, on these Stearman Speedmails. They make taxiing and handling easier.

# Goodrich Airplane Tires

Another B. F. Goodrich Product



Over 40 rubber articles for airplanes • Silvertown Tires • Abrasion Shoes • Tail Wheels • De-Icers • Matting • Hose and Tubing • Rubber Accessories

# A T T H E A I R P O R T S

## Ryan Builds at Lindbergh Field

IN accordance with its broadened scope of facilities, including two new buildings at Lindbergh Field, San Diego, Calif., the name of the T. C. Ryan Flying School has been changed to the Ryan School of Aeronautics. The entire organization of the company remains the same as before, with T. Claude Ryan as president and general manager; Earl D. Prudden, vice president and sales manager; O. M. James, secretary and treasurer, and John B. Fornasero, chief instructor of both flight and ground school departments.

Official ground-breaking ceremonies for the school's new \$50,000 administration building and hangar at Lindbergh Field were held recently. The buildings, which are expected to be completed by the middle of next month, are of Spanish architecture and steel and masonry construction. In addition to Ryan general offices and classrooms, the main building will provide space for administrative offices of Lindbergh Field, which is San Diego's municipal airport. As an official port of entry, this union depot of the air will house customs and immigration inspectors. Three glass-enclosed loading canopies will serve arriving and departing passengers on scheduled airlines, with one canopy reserved for planes from Mexico. By this arrangement the necessary customs inspection will not delay other airline schedules. Opening onto the main lobby will be four airline ticket offices, a public cafe and an airplane showroom, where the T. C. Ryan Aeronautical Co., southern California distributors for Great Lakes planes, will display a completely assembled ship. A central four-story tower will contain offices of the Department of Commerce, United States airport weather

bureau, complete teletype service and traffic control room.

The steel hangar is a separate building with a clear storage space of 100 by 120 feet. It will be provided with a fully equipped airplane repair shop. Sufficient door span and height is provided to allow the entry of the largest trimotors and autogiros now built.

## Des Moines Airport Buildings

BOEING Air Transport, Inc., plans to erect a \$40,000 hangar and administration building at the Des Moines, Iowa, municipal airport, according to an announcement by D. B. Colyer, vice president in charge of operations. Tentative plans call for a central building of three parts, the administration building to form the center, with the Boeing company's hangar, 80 by 120 feet, and the city municipal hangar at the ends.

The administration building will be two stories high. The first floor will be used for waiting rooms, ticket offices and other incidental quarters, and the second, for the radio room, airport manager's office and a Federal weather bureau aeronautical station.

## Extend Birmingham Carnival

DURATION of the Birmingham, Ala., air carnival will be extended to three days, and it is now planned to begin the show on June 3, ending June 5. The three-day carnival will celebrate the first anniversary of the dedication of the airport and its reception of the highest rating given by the Department of Commerce.

The anti-aircraft unit of Fort McClellan will be on hand with four anti-aircraft guns and six searchlights to repel a sham air night attack on June 3. In addition, there will be a demonstration

of night parachute landings and other features of night flying.

The afternoon of June 4 will be devoted to a mass flight over the city, military flight demonstration, exhibition flying, racing and a parachute jumping contest. The feature race will be flown on the afternoon of June 5. There will also be a novel parachute jumping contest, with all jumpers leaving their planes at the same time. Nearly \$2,000 in prizes will be given for the racing events and other spectacular features.

The carnival is to be under the auspices of the Birmingham Aero Club, with the assistance of the Birmingham Chamber of Commerce, the Junior Chamber of Commerce, the City of Birmingham, other civic organizations and the 106th Observation Squadron.

## Minneapolis Airport Active

TWO hundred ninety-six transport ships arrived and departed in April at Minneapolis Municipal Airport with a total of 1,305 passengers, according to a report by L. D. Hammond, director of the airport. Miscellaneous flights, including those of the Naval and Marine Reserve, student, sightseeing and private operations were 1,017, with 1,803 passengers. There are fifty-seven ships based at the field. Approximately 63,450 people visited the airport.

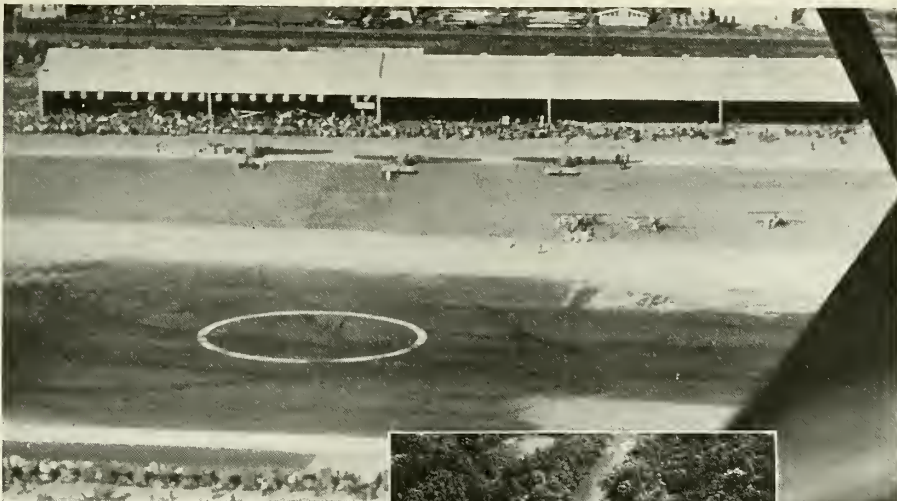
## Quincy Exchange Club Air Minded

EXCHANGITES of Quincy, Ill., have launched a drive to raise necessary funds for building a twelve-shop hangar on the municipal landing field. The club also plans an airway, embracing Jacksonville, Springfield, Danville, Peoria and Quincy, and is making application for air mail.

(Continued on following page)



Sketch of administration building and hangar, being constructed for the Ryan School of Aeronautics, San Diego, California



# WACO

## WIDENS YOUR CHOICE OF LANDING FIELDS

Probably the most important contributing factor to WACO's leadership in aircraft registrations, has been the matchless ability of WACO airplanes to negotiate landings and take-offs in "tight" places. For the claim stands unchallenged that a WACO can land and take-off in less space than any other airplane. It has been proved time and again . . . requiring in some instances less than 100 feet, actual measurement.

Of course, one would not care to do that as regular procedure, any more than one would always "bail out" simply because a parachute is worn. Nevertheless the one safety

provision is just as comforting as the other. And the chute can remain simply a seat cushion even when a clearing of only a couple of acres is the only available space in which to set down. For this is WACO's "extra factor of safety."

Moreover, the range of utility and of practicability becomes much less restricted. The destination need not be so cautiously selected. Desirable air journeys otherwise ruled out by limited landing facilities become feasible—in a WACO. You can land where you want to go.

When you consider that this notable characteristic of WACO air-

planes is obtained without freakish or untried design innovations, without sacrifice of speed and of normal utility, without penalty of excessive list price, maintenance expense and operating costs, the achievement is the more remarkable and the superiority the more conclusive. The result is WACO's continued leadership in aircraft registrations and in aircraft sales.

Have you experienced recently the thrill of WACO performance? Arrangements can easily be made. If you are not acquainted with the local WACO dealer, we would be glad to introduce you to each other.

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"ASK ANY PILOT"

WACO LEADS IN AIRCRAFT REGISTRATIONS

(Continued from preceding page)

### To Dedicate Elk City Airport

PONY express races, a bombing exhibition, stunt flying and air races are scheduled for the program to dedicate the new airport at Elk City, Okla., June 11 and 12, according to Dr. V. C. Tisdal, chairman of the committee in charge of arrangements. Aerial delegations from a number of Oklahoma and Texas cities and towns are expected to participate in the two-day event. Assisting Dr. Tisdal are W. D. Mock, president of the Western Oklahoma Flying School; Ted Maloy, editor of the Elk City *Daily News*, and W. A. Orr, Chamber of Commerce secretary.

### High Rating for Tulsa Airport

THE Tulsa, Okla., municipal airport has been granted an A-1-A rating by the Department of Commerce, according to Charles W. Short, Jr., manager. Among features of the field are: Availability of the entire field for take-off and landing, unobstructed approaches, sod surfaces with natural drainage, 8,100 to 3,300-foot surface distances in all directions, a 2½ per cent maximum slope of the landing area and a north-south asphalt take-off strip, 100 by 1,550 feet.

The field also has a 4,000-foot concrete taxi-strip connecting four major hangars; an approved repair station, a terminal building, Government weather, radio and range beacon stations; air passenger accommodations, an alternating white-and-green-light rotating beacon, fifty-four boundary and approach lights with red obstruction lights, complete first-aid kits in all hangars and buildings, electric fueling facilities and fuel trucks. Thirty-two regular airline schedules are now active at the field, with others to be added shortly.

### Kansas City Traffic Gains

FIGURES for the first three months of 1932 indicate that air passengers arriving and departing at the Kansas City Municipal Airport during 1932 will

greatly exceed the number for 1931. This year 620 more passengers were transported during the period of January to March than for the same three months last year.

### School Opens Seattle Branch

ORGANIZATION of an airplane sales and service company and a flying school on Boeing airport in Seattle by the Rasmussen-Meadows company, operators on Swan Island airport at Portland, Ore., for the last year and a half, was announced last month by Lieut. James Lester Meadows, president of the Portland company.

Five airplanes will be used by the company at the two airports, with a new Aeronca cabin monoplane and a new Fairchild "22" training monoplane located on Boeing field, and a Fairchild "22" training monoplane, a Waco biplane and a Fleet biplane, located on Swan Island airport, Lieutenant Meadows said. Ed. Rasmussen, vice president of the Portland company, will be president, general manager and chief pilot for the Seattle company, while Lieutenant Meadows will continue as head of the concern in Portland.

### Traffic Aid Tested

A SPECIAL traffic control projector, developed by the Aeronautics Branch of the Department of Commerce, has been undergoing service tests at Floyd Bennett Field, New York City municipal airport. The traffic light, in the form of a despatch gun, has a ray projection visible to fliers for a distance of eight miles in daylight.

### Allegheny Airport Lighting

THE floodlighting of the Allegheny County Airport, Pittsburgh, will represent the most modern equipment and will make possible night landings as safe as those made in the daytime. Planned by engineers of the Westinghouse Electric & Manufacturing Co., the lighting will consist of marker lights along the 500-foot runways and around the boundary of the entire field, together with revolving beacons, illuminated wind tees, traffic control lights, searchlights and other devices.

The airport covers more than 148 acres, being 3,600 feet long from east to west and 1,800 feet wide. Prevailing winds require the use of five runways with floodlighting banks placed to illuminate the entire field. Twenty-five items are included in the requisitions for lighting the field.

### School Opens at Boston Airport

THE New England Cooperative Aircraft School has leased part of the Skyways hangar of the Ames-Skyways Corp. at Boston Municipal Airport and has taken over the Skyways engine room. Day and evening courses are given during the summer at the airport, with the facilities of the Ames-Skyways shops open to the students.

The two-year course is given in cooperation with Wentworth Institute and Boston University. It is planned to give a 'mechanics' course with the classes in the daytime, Saturday afternoons and some evenings. Students may enroll for five-, ten- and twenty-week courses. Flight and practical shop work will be given at the airport, while a business administration course and basic classes will be held at Boston University and Wentworth Institute.

### Plan Airports for Philadelphia District

DEVELOPMENT of the Hog Island air-rail-water terminal was urged in a report of the Regional Planning Federation for the Philadelphia tristate region recently. The report also stressed the importance of air transport terminals to serve Wilmington, Del., and North Philadelphia, and called attention to the need for an airport at Chester, Pa., and twenty-four air service bases and seven auxiliary fields at designated locations in Pennsylvania, New Jersey and Delaware.

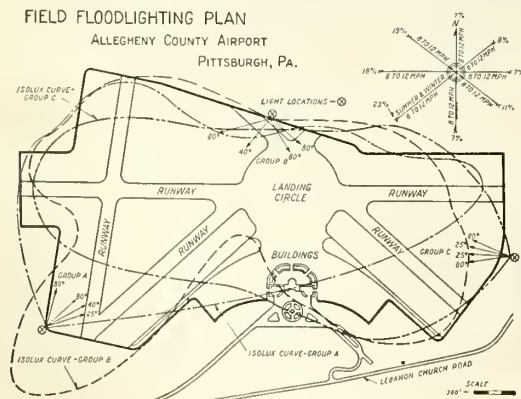
It was also suggested that five additional airlines be ultimately established to serve the district, which already has three national lines. This section of the report called attention to the fact that during the year ending in September, 1931, twenty-three per cent of the air passengers carried in the United States were transported through this region and that about 42,000 passengers landed or took off at Central Airport, Camden.

The aviation section of the report was prepared by Maj. Samuel B. Eckert, who collaborated with Col. H. H. Blee of the Department of Commerce.

### To Improve Missouri Field

THE Allton Airport at Columbia, Mo., located half-way between Kansas City and St. Louis, is to be improved and operated by the city, according to recent action by the city council. Tentative plans call for the grading of the entire field, construction of two runways, fifty feet wide, and the purchase of about thirty-five additional acres of land. Income from hangar rentals and commercial operations, as well as the yearly amount paid by the Government to the city for electricity, will cover maintenance costs.

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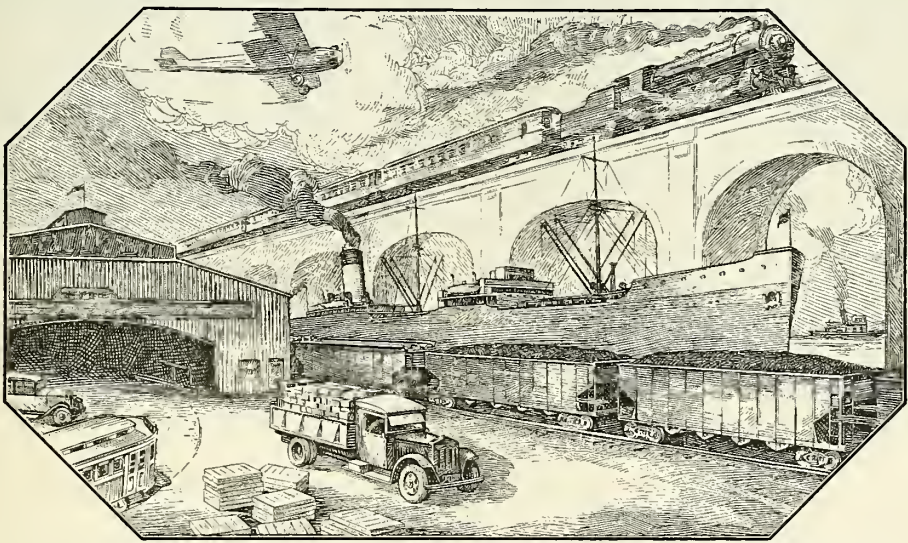
# AMERICAN



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(Continued from preceding page)

### Launch Plane at Baltimore Port

A SEAPLANE RAMP, the first completed unit of the Baltimore Municipal Airport, was dedicated recently in connection with the launching of a seaplane. The ceremony marked the placing of the airport into active service for the first time. The field, which will become Baltimore's permanent municipal airport when completed, is being constructed under a loan of four million dollars.

The seaplane, the *Antares*, was built for the U. S. Coast Guard by the General Aviation Manufacturing Corp., which has established its aircraft factory on a portion of the airport leased by the city for this purpose. The plane was piloted in its test flight by Maj. V. E. Bertrandias, sales manager and chief test pilot of the company. He was accompanied by Lieutenant-Commander C. H. Schildhauer, assistant manager and test pilot, and Capt. J. F. Hottel, commandant of the Baltimore Coast Guard depot. The plane was christened by Mrs. F. C. Billard, wife of Rear-Admiral Billard, commanding officer of the Coast Guard.

The plane is a new type of flying boat, designed for salvage, rescue and patrol work. It has a cruising radius of about 1,200 miles, can attain a speed of 125 miles per hour and is equipped with radio, rubber lifeboat, a stretcher and first-aid kits. Several other planes of the same type are to be built by the company.

### San Francisco Tries New Fees Plan

SAN FRANCISCO Bay Airdrome put into effect a "pay as they fly" plan May 1. The new rates show a decided reduction in hangar space charges, which is compensated by a moderate passenger landing fee. The plan makes terminal cost to transport operators in proportion to the number of passengers carried during the current month. The charge consists of a base rate plus an additional charge for extra cost and is believed to be fairer than the schedule of fixed charges which formerly prevailed. The amount paid for each individual landing fee is so small that the rates to the public will not be affected.

### Choose United Airport Leaders

THE FOLLOWING officers of the United Airports Co. of California, Ltd., Burbank, Calif., were elected recently: P. G. Johnson, president; Gurney Newlin, vice-president; Fred Denslow, vice-president and treasurer; T. J. Ecker, secretary. In addition to these men, directors elected for the ensuing term were: Frederick B. Rentschler, William E. Boeing and J. F. McCarthy.

Spicer-Santry Co. at United Airport has been reorganized under the name of Richard W. Spicer Co. Howard Murchie has been appointed chief instructor, and F. M. S. Miller, in charge of sales. The firm operates a flying school and is dis-

tributor in Southern California for Fleet airplanes.

S. S. Hatheway and R. V. H. Mather, who have been appointed local representatives for the Kellett Autogiro, have leased space at United Airport. The first closed model autogiro arriving on the Pacific Coast was flown recently from Philadelphia by G. H. Miller, chief pilot and sales manager for the new concern.

### Tulsa Airport Shows Profit

TULSA, OKLA., Municipal Airport has announced a continued operating profit, month by month, for the past two years. Last year they gave the port an operating profit of \$12,700, an average of more than \$1,000 per month. This year's average will be practically as good, officials estimate.

The port's heaviest income from an individual item is realized on gasoline, the profit on which amounted to \$882 in April. Overhead expenses have been decreased during the last few months.

### Love Field Activity Rises

A SHARP increase in intercity transport was shown in April over March at Love Field, Dallas, Tex., Preston Sneed, airport director, reported. A total of 1,310 ships entered the port and 1,318 departed. Passengers numbered 3,968.

### Texas Airport Changes Managers

MANAGEMENT of Robert Mueller Municipal Airport, Austin, Tex., has been taken over by Gifford Flying Service of Beaumont. In addition to the regular service to mail and passenger planes, the company is conducting a flying school at the port. H. B. Naylor is manager.

### Heavy Traffic in California

OAKLAND Municipal Airport reports 6,923 plane landings, with 2,392 passengers, for April. A total of seventy-six planes, the largest number in the history of the field, are permanently stored at the airport, according to the April report.

An inhalator has been added to the emergency equipment at the field. The airport's A-1-A rating recently was renewed for one year following an inspection by M. C. Hoppin of the Department of Commerce.

During the week ended April 14 San Francisco Bay Airdrome totaled 700 passengers per day. Double-headers were operated on the Varney run to Sacramento.

### Rent Oneida Airport

A YEAR'S lease on Oneida, N. Y., airport has been taken by S. L. Williams and E. E. Scott, Albany. The port will be made available for public and private purposes, while state police also will be allowed to use it.

### Instrument Company at Roosevelt

THE McNeil Instrument Co. has rented a building at Roosevelt Field, Long Island, N. Y., where it will conduct a field experimental laboratory and auxiliary plant. The organization manufactures an electrical instrument for the detection of the exact location of a distant source of heat. This device is at present utilized at sea on specially constructed sextants, enabling the navigator to take a reading of the location of the sun while the sun is entirely invisible due to fog or clouds, but it is planned to use the same principle in connection with "Fog Eye" beacons for airplane navigation. The resident engineer in charge of the new laboratory is Dr. J. N. A. van den Bouwhuijsen.

### Start Service at Somerton

J. R. KELSEY, formerly with the J. Wright Aeronautical Corp. and the Lycopring Manufacturing Co., has established a service for Continental Motors at Somerton Airport, Pennsylvania. Spare parts and facilities for overhaul are available.

### Curtiss-Wright Airports Gain

THE financial report of the Curtiss-Wright Airports Corp. for the year ending Dec. 31, 1931, showed a net loss, after expenses, interest and other charges, of \$743,902, as compared with a deficit of \$2,247,030, before the deduction of \$56,014 loss on the liquidation of Curtiss-Wright Exhibiting Corp. in the previous year. The airports organization is controlled by Curtiss-Wright Corp.

## CONTACTS

FRANK E. SAMUELS

THOSE WHO imagine that interest in aviation is not as intense as it ever has been should have been at the Kern County Municipal Airport, Bakersfield, Calif., May 1, when the annual air circus, under the auspices of the Kern County Post of the American Legion was held. Over 40,000 persons were in attendance.

Ninety-seven of the latest model airplanes, flown by the best pilots, congregated at the airport. Thirty-two Army and Navy planes made maneuver flights. There were three closed course air races, one for women pilots; sustained parachute drops and stunt flying, a dead-stick landing contest, a balloon strafing contest, and an aerial dog-fight between two "Hell's Angels" daredevils, Roy Wilson and Frank Clark.

The women's race was won by Mrs. Peacock, whose husband operates a flying service at the airport, while Bobbie Trout came in a close second. The free-for-all race was won by Gladys O'Donnell, with Frank Clark and Roy Wilson in second and third places.

# Use Roosevelt Field

AMERICA'S PREMIER AIRPORT

*The Center of Commercial Aviation in the East*



*Typical Concrete and Steel Hangars*



*Typical Wooden Hangars and Buildings*

## ★ The Most Logical and Ideal Location ★

**LOCATION:** Most conveniently accessible by air from other metropolitan airports and Northeastern U.S. Situated well away from water, swamps and industrial smoke, the meteorological conditions are the best in the area.

**SAFETY:** Offers greatest flying safety with three great airports, twelve golf courses and open country all within a three mile radius, absence of congested building areas, water and swamps. Emergency landings are safe.

**FACILITIES:** Fifty buildings, 350,000 sq. ft. hangar space of which 131,000 is in new concrete and steel hangars, complete night lighting, two famous all-way fields with 1,800,000 sq. ft. paved runways, taxiways and aprons.

**COST:** Rental from 32¢ per sq. ft. per year up, according to buildings, which is most reasonable considering facilities and convenience to the world's largest city and America's densest flying area.

**ACTIVITY:** There are more airplanes in New York than any other State, more in its metropolitan area than elsewhere in New York, and twice as many at Roosevelt Field than at any other metropolitan airport.

**PROMINENCE:** The most famous and widely known aeronautical address in the world, it has long dominated as the commercial aviation center of the East. This is a valuable asset to your aeronautical business.

## MOST CONVENIENT TO NEW YORK CITY

Express train service provides shortest and most dependable transportation to center of Manhattan. Over 80 trains per day, some taking only 32 minutes, ply between Penn. Station, N. Y. City and Mineola, the Field station. Excellent motor roads and a private parkway lead to the Airport.



*The Roosevelt Field Hotel - Modern in every appointment*

**Airplane Agencies:** Bird, Lockheed, Monocoupes, Aeromarine-Klemm, Kittyhawk, Stearman, Stinson, Waco, Aeronca, Fairchild, Fleet, Standard, Aristocrat, Amphibions, Travel Air, Kellett Autogiro, Curtiss-Wright, Rearwin-Kenroyce.

**Service Hangars:** Air Associates, Inc., Air Services, Inc., Fleetwings, Inc., General Airplanes, Inc., N.C.L., Inc., Aero Trades Co., Long Island Aero Service, Geo. M. Pynchon, Jr., Inc., Roosevelt Aviation School, Inc.

**Repair Services:** Air Associates, Inc., Air Services, Inc., Long Island Aero Service, General

Sheet Metal & Welding Co., Parker Motor Rebuilding Co., Roosevelt Aviation School, Inc., Giro Sales & Service, Aero Trades Co., Engine Air Service.

**Supply Houses:** Air Associates, Inc., Air Transport Equipment, Inc.

**Ports and Services:** Motors: Kinner, Cirrus, Pratt & Whitney, Continental, Warner, Wright, Menasco, Parachutes: Irving, Russell-Loeb, Switlik, Bendix, Pioneer Instruments, American Paragon Wood Propellers, Hamilton Standard Steel Propellers, Eclipse Starters, Scintilla Magnets, Stromberg Carburetors.

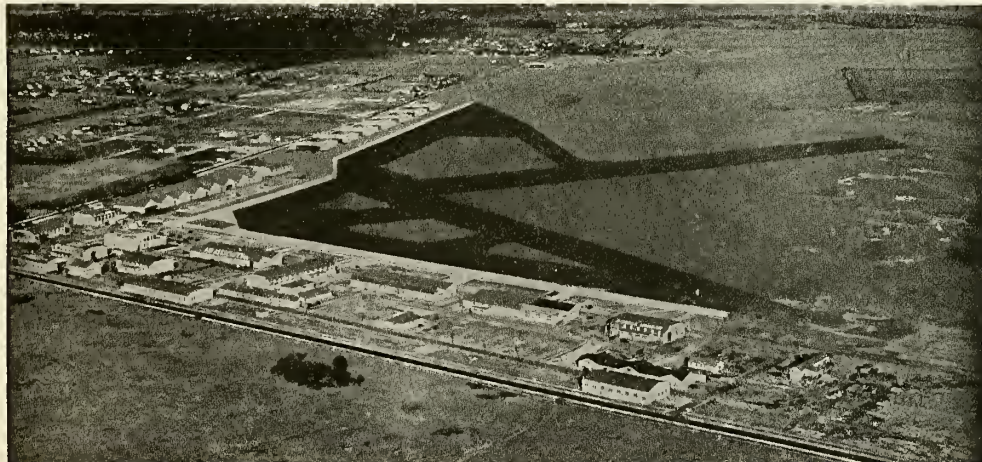
**Manufacturers:** Amphibions, Inc., Fleetwings, Inc., General Airplanes, Inc., Grover Loening Aircraft Co., Air Transport Equipment.

**Aerial Advertising:** Plane Speaker Corp., Skywriters, Inc., Fairchild Aerial Surveys, Air News, Inc.

**Experimental Laboratories:** Fleetwings, Inc., R.C.A., Good Inventions, Inc.

**Aviation School:** Roosevelt Aviation School, Inc.

**Airplane Taxi Service:** Roosevelt Flying Corp. Divisional Office for District No. 1, Aeronautics Branch, U. S. Department of Commerce.



*Write us your requirements*

**ROOSEVELT FIELD, INC.**

*Drawer F  
MINEOLA, N. Y.*

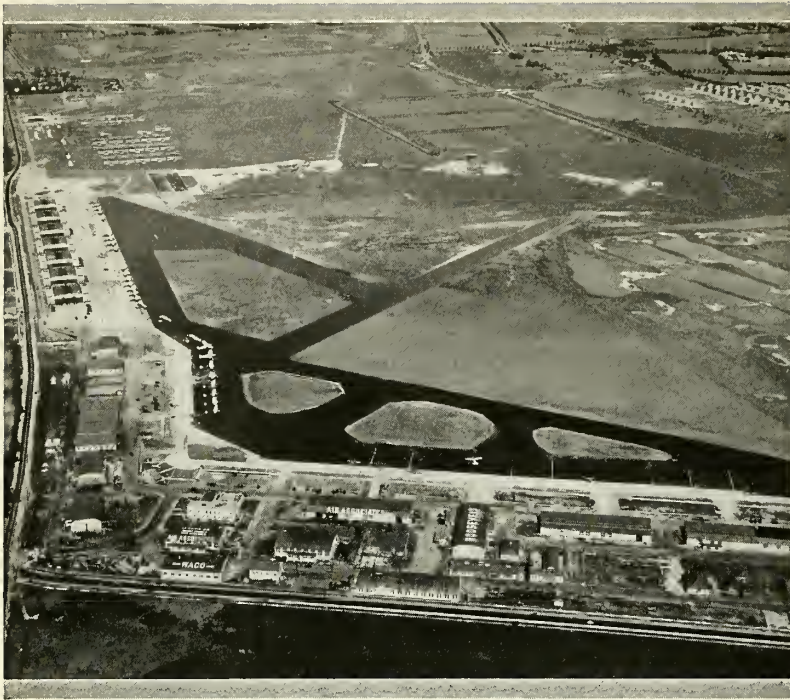


Photo courtesy Fairchild Aerial Surveys

# ROOSEVELT FIELD

By George W. Orr, President, Roosevelt Field, Inc.

WHEN flying really began (and that was 1909, although the first flight was some years earlier), search was made for a location convenient to New York City and having good natural terrain and weather conditions. The high, dry and level expanse of the Hempstead Plains, near Garden City, was chosen as the ideal spot. It is here that the field that later was to be named "Roosevelt Field" was established. At this field, in the summer of 1909, Glenn H. Curtiss won the *Scientific American* trophy by flying twenty-five miles. That same year, Charles Willard made a cross-country flight of twelve miles, and Wilbur Wright circled the Statue of Liberty, starting from these plains.

In 1915 the New York National Guard organized an active aviation unit which won distinction soon after the United States entered the World War. This unit, the Aviation Detachment of the First Battalion, Signal Corps, was under the command of Lieutenant R. C. Bolling, who was killed in action during the war and after whom Bolling Field (Washington, D. C.) was named. At the National Guard flight training headquarters at the old "Hazelhurst Field" many prominent young men learned to

fly; among them was Quentin Roosevelt, a modest, likable chap who worked as hard as any rookie on the field; he was among the first American-trained fliers to be killed in aerial battle. It was after Quentin Roosevelt that the field was given its present illustrious name.

After the war, a most noteworthy event at the field was the landing of the British military airship R-34 following her successful trans-Atlantic flight from East Fortune, England. This was at 9:40 a. m. on July 6, 1919. The 3,000-mile flight had taken 108 hours. Just before midnight three days later, the R-34 left for its return flight to England, where it landed safely after a flight of three days, three hours and three minutes.

On December 29-30, 1921, Eddie Stinson and Lloyd Bertaud in a Junkers-Larsen monoplane established an endurance record of 26 hours, 19 minutes, 35 seconds.

In 1927, the following trans-Atlantic flights took off from Roosevelt Field:

May 20-21. Charles Lindbergh, in a Ryan monoplane, *Spirit of St. Louis*, flew to Paris, winning the Orteig prize. Distance, 3,610 miles; time, 33 hours, 30 minutes.

June 4-5. Clarence Chamberlin, with Charles Levine as passenger, flew his Bellanca plane, *Columbia*, to Eisleben (near Berlin), Germany, a distance of 3,911 miles.

June 29-30. Commander Richard Byrd and his crew of three (Acosta, Balchen and Noville) flew to France, landing his Fokker trimotor, *America*, offshore at Ver-sur-Mer because of fog.

October 10-11. George Haldeman, pilot, and Ruth Elder took off in a Stinson monoplane, *American Girl*, on an attempted flight to Paris but were forced down by engine trouble 325 miles north-east of the Azores. The flight established an over-water distance record of 2,623 statute miles.

In 1929, several record-breaking flights started or terminated at Roosevelt Field:

February 4-5. Captain Frank Hawks and a mechanic flew non-stop from Los Angeles, setting a new west-east record of 18 hours, 21 minutes, 59 seconds.

March 27-28. Martin Jensen set a world solo duration record of 35 hours, 33 minutes, 20 seconds.

April 23-24. Elinor Smith established an endurance record for women of 26 hours, 21 minutes, 32 seconds.

June 27-29. Captain Hawks set a new east-to-west transcontinental speed record of 19 hours, 10 minutes, 32 seconds, flying to Los Angeles, Calif., and a new west-to-east transcontinental speed record of 17 hours, 38 minutes, 16 3/5 seconds, flying from Los Angeles to Roosevelt Field. Round trip, 36 hours, 46 minutes, 38 3/5 seconds.

In 1930 the following records were made:

March 10. Elinor Smith broke the women's altitude record when she ascended to 27,418 feet in a Bellanca monoplane.

April 20. Colonel and Mrs. Charles Lindbergh left Glendale, Calif., at 8:26:20 a. m. and landed at 11:11:52 p. m. Total flying time, 14 hours, 23 minutes, 27 seconds. 172 miles per hour.

June 21. Colonel Roberto Fierro, Mexican flier, made a non-stop flight to Mexico City, covering the distance of 2,300 miles in 16 hours, 35 minutes.

June 23-26. Major Kingsford-Smith and crew flew from Ireland in the *Southern Cross*.

October 18. Laura Ingalls made the eastward crossing of the United States from Los Angeles in 25 hours, 35 minutes, flying time. A Moth biplane with a Cirrus engine was used.

November 9. Captain Hawks flew from Havana in 8 hours, 42 minutes, in his *Texaco 13*.

November. Alicia Patterson flew her Speedwing Laird from Cleveland in 2 hours, 41 minutes.

December. Ruth Nichols made a rec-



ord-breaking flight from Los Angeles, via Wichita, Kans., in 13 hours, 32 minutes.

Last year the following events took place at Roosevelt Field:

February. Captain Hawks established a new record of 55 minutes from Boston, his average speed being 207 m.p.h.

June. Bob Hall in a Gee Bee low-wing monoplane, flew from Springfield, Mass., making the trip in 33 minutes—at the rate of 236 miles an hour.

Wiley Post and Harold Gatty took off at 4:56 a.m. Tuesday, June 23, in the *Winnie Mae*, and returned on July 1, after circling the globe in eight days, 15 hours, 51 minutes.

July. Captain George Endres and Captain Alexander Magyar left in their Lockheed plane, *Justice for Hungary*, July 13, for Budapest, making the flight in about 32 hours, 45 minutes.

July 18. James G. Hall in his *Cru-sader*, a Lockheed Altair, flew to Havana in 8 hours, 47 minutes.

August. Captain Hawks flew to Fort Worth, Tex., in 7 hours, 57 minutes, setting another record.

August 31. James Hall made a record-breaking flight to New Orleans in a little more than seven hours.

September 13. Celebration of the first air mail flight, which took place on September 23, 1911, by reenactment of the flight.

October 27. Jimmy Doolittle took off for Ottawa in his Laird *Super-Solution*; from Ottawa he made a 2,500-mile flight to Mexico City, via Washington, D. C., between approximately 5 a. m. and 5 p. m.

December 14. Captain Hawks made a record flight from Chicago, covering the distance in 3 hours, 15 minutes.

History is not Roosevelt Field's only claim to distinction. Its glamor is romantic and its fame valuable, but aviation has passed its purely romantic stage;

it is now a business. And in this day of efficiency and competition, leadership depends upon modern, up-to-date equipment. Roosevelt Field, as it appears today, is really a merger of three fields, containing in all some 500 acres of the Hempstead Plains. This combination includes the famous old Roosevelt Field, from which nearly all trans-Atlantic flights started (now known as Unit No. 1), the original Curtiss Field and a large tract of land lying between these long established airports, designated as Unit No. 2. While known under one name, all of these three fields are used by airplanes, and so to get a correct picture of Roosevelt, one must visualize three great all-way fields adjoining each other.

To insure all-weather conditions, and in addition to the fact that all the surface is high, dry and well sodded, a system of paved runways has been constructed, making possible a take-off into the wind in a choice of ten directions. This system of runways, taxiways and aprons called for some 1,800,000 square feet of paving. The subjugation of dust was accomplished at the same time.

While Roosevelt already had more buildings and space than any other airport, an extensive program of construction was undertaken and completed, giving the airport 131,000 square feet of modern concrete and steel hangars and a new hotel and extensive restaurant facilities. These improvements bring the buildings of the field to the unequalled amount of fifty aeronautical structures and hangar space of approximately 350,000 square feet.

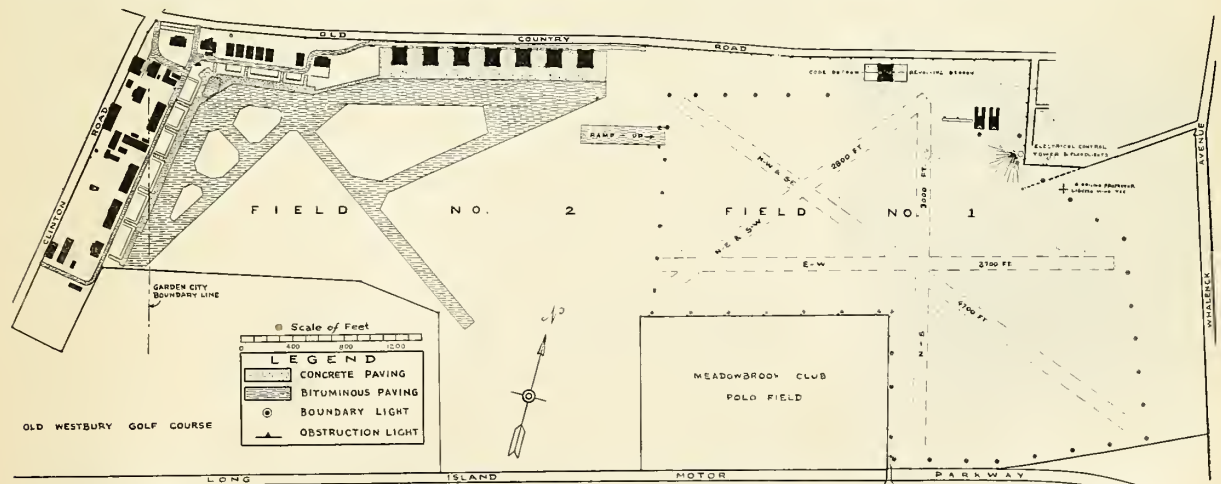
There are miles of road, the main ones paved, an electric light and power system, miles of drainage and sewer piping, gas, water and similar facilities. Some thirty-two operators carry on their business at the field, their activities ranging from the sale of gas to the

manufacturing of complete airplanes.

For night flying, a most complete system of lighting has been completed, including a four-million-candlepower Sperry floodlight, auxiliary floodlights which are illuminated automatically if the arc flood fails, double-ended revolving beacon with white and green lights of three-million candlepower and visible for more than seventy miles, a thirty-million-candlepower searchlight, ceiling finder and code beacon. The night field is outlined by border lights and all obstructions marked with red signals.

Fliers like the convenience of the field, to the city, with over eighty trains a day from Manhattan and Brooklyn to Mineola, the field station, many taking only thirty-two to thirty-six minutes, or the excellent motor roads to all points. Mitchel, the large Army field, is immediately adjacent at the south. There are twelve eighteen-hole golf courses within a radius of three miles and many open fields in the vicinity. These advantages, together with the absence of surrounding swamps and congested buildings, increase the safety of flying operations and emergency landings.

The layman who goes to the airport for an airplane ride, flying instruction or just entertainment likes the background of romance and history that pervades the atmosphere, the chance to watch the activities of those who have made and are making that history. If flying, they like the record of safety through years of operation of the Roosevelt Flying Corp. Roosevelt Aviation School is well known for its long experience, its splendid equipment and personnel, its highest Government rating and its situation. Free parking spaces for visitors' automobiles are provided right out on the flying line. By means of a public address loudspeaker system, announcements are made and events are explained to the visitors.



Layout and arrangement of Roosevelt Field, Mineola, Long Island, showing bituminous runways, hangars and other buildings



# PERSONALITIES

THE Caldwell-Morgan medal for bravery is awarded Ike Vermilya and Jiggs Huffman for their courage in starting a new business in these hard times—to wit, the Vermilya-Huffman Flying Service, Cincinnati, Ohio. This Caldwell-Morgan hero medal, when, as and if minted, cast, moulded or otherwise caused to spring into being, is the idea of myself. And if the idea gets anywhere it will be paid for by J. Pierpont Morgan. If it doesn't get anywhere you will know that he refused to pay for it. All I contribute is the idea.

And the idea is to turn out a solid platinum medal, the size of a soup plate or even larger, to be worn by the new business man, as a reward for and recognition of his bravery, audacity, temerity or whatever it was that caused him to embark in business during a slump, depression, panic or period of national innocuous desuetude. This medal differs from all others in that, if the recipient goes broke, he can pawn the medal and invest the proceeds in hot dogs and coffee. Among the assorted panaceas for the panic that I have noticed, this is the only one that offers even a ghost of a reward to anyone who will start something. It will remain a ghost of a reward, moreover, unless J. Pierpont Morgan seizes upon the idea and shells out the cost of the medals.

Now, Pierpont—may I be friendly and call you Pierpont?—I select you to back this medal idea because you are the only man outside of Andy Mellon who has any money left. I eliminate Andy from consideration because he's of Scotch



descent and his whole training has given him a grip on coin that only death will loosen. But you, Pierpont, have occasionally given things away. Only recently I heard you give away some advice over the radio. You advised the poor to help the poor, and not bother you, if I recall it correctly. And you are a patron of the arts. Well, what art is more noble than the art of starting a new business in times like these? Who knows? These boys may make enough money to buy some of those defunct foreign government bonds you sold in 1929. Anyhow, they deserve all the encouragement philanthropists like you and me can give them. While you call up Tiffany and have the medal made, I'll give you a few brief notes about these lads.

Wright Vermilya, Jr., learned to fly in France and on his return bought a plane and barnstormed. He served in the Army Air Corps Reserve at Cincinnati and in the Arkansas National Guard squadron at Little Rock, where he became a flying instructor. He was test pilot and flying engineer for the Commandaire Company when he hit upon the idea of riding on instead of in the fuselage of a Commandaire to demonstrate the plane's stability. This stunt got him into the movies, though not in Hollywood. He was found to be long on courage but short on sex appeal. In 1929 he returned to Cincinnati where he has been engaged in flying for several Cincinnati plane owners.

Stanley C. Huffman entered aviation with Billy Brock at Springfield, Ohio. They built gliders together at the rate of one glider to one crack-up. Then Jiggs learned that if he became a cadet the government would pay for the crack-ups, so he learned to fly at Carlstrom, Brooks and Kelly fields. He graduated from the Army's technical school at McCook Field, barnstormed for a firecracker company, demonstrating fireworks on an old Standard at night, and in 1926 joined John Paul Riddle at Cincinnati and

helped build the Embry-Riddle Company. He flew the first air mail from Cincinnati to Chicago. When the company became the Embry-Riddle Division of American Airways, Jiggs Huffman was operations manager, a position he held until he resigned to enter the partnership with Vermilya.

The Vermilya-Huffman Flying Service maintain storage and sales service at Lunken Airport and will act as consultants and aviation advisers for private plane purchasers and for corporations using planes in business. They will not do general instruction work, but those buying planes through the company will be taught to fly. They also maintain an air taxi service, a club room at the hangar and transportation downtown for visiting pilots. That last feature alone should win them the Caldwell-Morgan medal, when, as and if issued. But that, of course, is up to my partner, Pierpont.



THE indefatigable Robert Johnson, Manager of Publicity of the Boeing Airplane Company, and the tireless Harold Cray, Manager of Advertising and News Service of United Air Lines, for whom no labor is too severe, even unto reading my remarks each month, both take pen in hand to inform me that another correction is due from these parts. You may recall that some months ago I incautiously wondered, in print, if I hadn't carried the first contract air mail from the United States to a foreign country. Mr. Inglis Uppercu set my wonderment at rest forever by stating in stentorian tones that his own Aeromarine Company held that honor. I published the correction. And now these two delvers into the past inform me that Mr. Uppercu also is out of order, for the first contract air mail service in the United States was begun in August, 1920, and that the late Edward Hubbard was flying mail for the post office in a Boeing seaplane, somewhat prior to the official awarding of the U. S. Postal contract.

Bob Johnson writes: "I have before me an old clipping from the Seattle Times which describes what they choose to call the first international mail trip by airplane on this continent, namely the carrying of mail by plane from Vancouver,

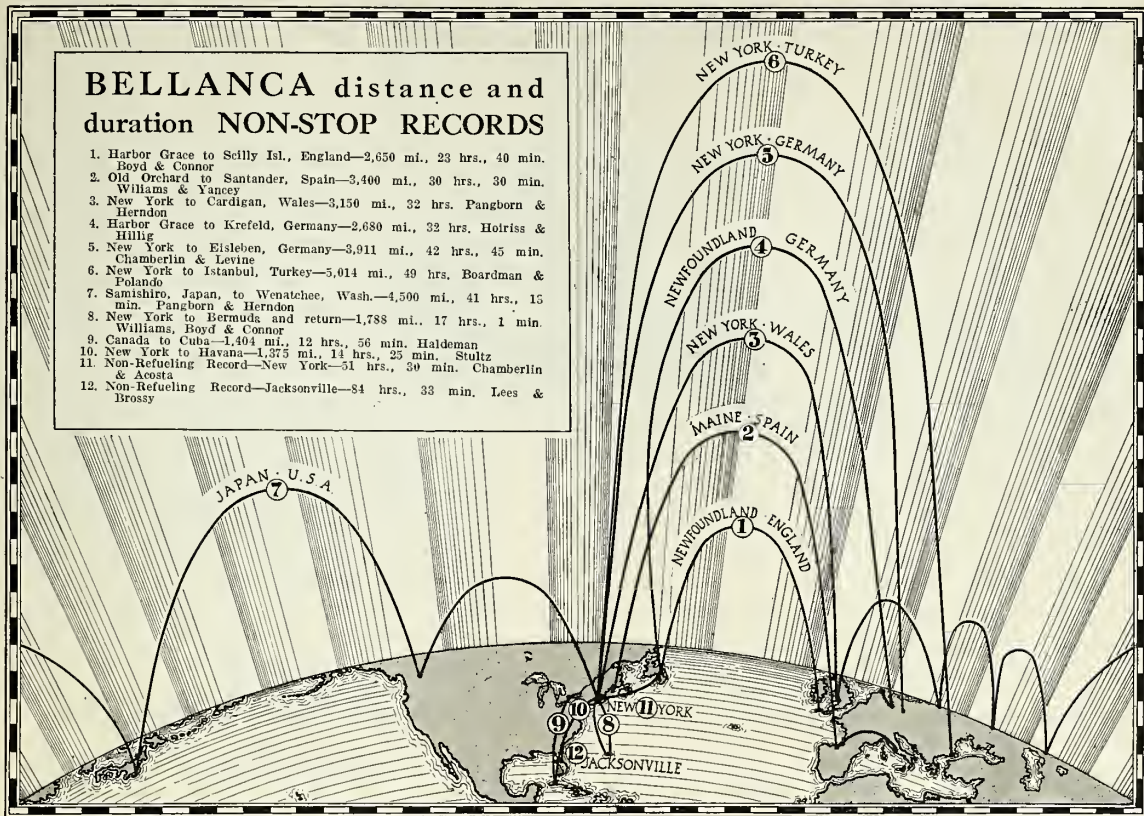
(Continued on following page)



All ready to yank in the customers

### BELLANCA distance and duration NON-STOP RECORDS

1. Harbor Grace to Selly Isl., England—2,650 mi., 23 hrs., 40 min. Boyd & Connor
2. Old Orchard to Santander, Spain—3,400 mi., 30 hrs., 30 min. Williams & Yancey
3. New York to Cardigan, Wales—3,150 mi., 32 hrs. Pangborn & Herndon
4. Harbor Grace to Krefeld, Germany—2,680 mi., 32 hrs. Holiriss & Hillig
5. New York to Eisleben, Germany—3,911 mi., 42 hrs., 45 min. Chamberlin & Levine
6. New York to Istanbul, Turkey—5,014 mi., 49 hrs. Boardman & Polando
7. Samishiro, Japan, to Wenatchee, Wash.—4,500 mi., 41 hrs., 15 min. Pangborn & Herndon
8. New York to Bermuda and return—1,788 mi., 17 hrs., 1 min. Williams, Boyd & Connor
9. Canada to Cuba—1,404 mi., 12 hrs., 56 min. Haldeman
10. New York to Havana—1,373 mi., 14 hrs., 25 min. Stultz
11. Non-Refueling Record—New York—51 hrs., 59 min. Chamberlin & Acosta
12. Non-Refueling Record—Jacksonville—84 hrs., 33 min. Lees & Brossy



# LONG RANGE

Bellanca planes are unanimously approved by long-distance flyers because of extraordinary LIFTING CAPACITY — STURDY CONSTRUCTION—DURABILITY—STABILITY —RELIABILITY established by years of leadership.

Long-range expeditions are the "proving field"

of the air transport. Both the private owner and the commercial operator of Bellanca air-planes are assured of the fundamental value of Bellanca design as confirmed by these supreme tests. Efficiency and economy in everyday flying can be gauged by the serviceability of the many Bellancas that have made aircraft history.

*Full particulars on request, regarding the Pacemaker and Skyrocket, the Air Cruiser and the Airbus, or special long-distance planes.*

# BELLANCA

BELLANCA AIRCRAFT CORPORATION

New Castle, Delaware

Bellanca Aircraft of Canada, Ltd., Montreal

(Continued from preceding page)

B. C., to Seattle. I quote from the clipping: 'Mr. William E. Boeing gave an illustration of what aerial mail looked like when, accompanied by his pilot, Eddie Hubbard, he drove a plane of his own manufacture to Vancouver, B. C., and return, bringing back with him a package containing sixty pieces of mail from the post office at the British Columbia metropolis. So far as known, this is the first time mail was internationally carried by airplane. (March 3, 1919.) The type of machine used by this pioneer mail carrier was a seaplane which the owner and builder had designed for the United States Navy.'

Mr. Crary states that this same ship was retired from service only two years ago, and that it had flown more miles than any airplane in existence, and still holds the record. Anyone disputing that statement will please battle with Mr. Crary direct. I'm all through saying who was first, or who flew the most miles, because when I innocently make such a statement I almost immediately find sixteen gentlemen trying to bite me on the left ear, and fighting each other for a preferred biting position. I have a hunch that Mr. Crary will now find that a dozen old air mail pilots are throwing pet D. H.'s at him, full of miles and hours. Anyhow, that ship Harold Crary is so proud of was one of the first built by Mr. Boeing at the time he started what was then a small airplane factory in Seattle. Incidentally, that Seattle-Victoria route always has been flown with Boeing flying boats, and at the present time Percy Barnes operates a Boeing on that line.

So it appears that the honor of carrying the first international air mail should be accorded to the late Edward Hubbard and W. E. Boeing. Hubbard also has the distinction of operating the first foreign air mail route on the first contract to be awarded a private contractor by the Post Office Department.

Eddie Hubbard was born in San Francisco in 1889 and became an Early Bird when he learned to fly in 1912. Three years later he established a barnstorming base in Seattle, and in 1916 and '17 served as an Army instructor at Rockwell Field. Near the end of 1917 he returned to Seattle to become test pilot for the young Boeing Airplane Company. That first flight from Vancouver to Seattle on March 3, 1919, was followed on Oct. 15, 1920, by the first contract air mail flight from Seattle to Victoria. Five days after the inauguration of the service he made what is thought to be the first night air mail flight when he left Victoria with 300 pounds of mail at 7:15 p.m. and arrived at Seattle at 8:30 p.m.

In 1927 when the Post Office Department turned over the operation of its air mail service to contractors, Boeing Air



Eddie Hubbard and William Boeing

Transport took over the Chicago-San Francisco route. Edward Hubbard was vice president in charge of operations.

In my old flight log under date of Nov. 27, 1923, I have recorded a flight of twenty minutes at Pensacola, Florida. The passenger was Eddie Hubbard, and the plane, the old Martin 67 which I was trying to unload on the U. S. Navy.

What a fine, quiet, capable pilot and courageous gentleman was Eddie Hubbard! And what a merry time he and George Post and I had with those odd craft with which we attacked the purse of the poor old Navy! We flew our own ships and each other's, we swam in the sea, walked along the beach and spent long hours telling the Naval officers how much better were our planes than our competitors'.



**R**ICHARD J. LAUGHLIN learned to fly in the Army at Souther Field, Americus, Ga., during the war, received his commission and had advanced training at Gerstner Field, La., and put in a few hours in the Army as an instructor. After he got out of the Army he barnstormed around Texas and Oklahoma for a couple of years until he noticed that he was wasting away for lack of nourishment.

For the next few years he flew only occasionally in Army Reserve ships until the summer of 1927, when he got a transport license and again went back into flying as a



Laughing Dick Laughlin

means of livelihood. In 1927 the eating era really started in aviation. He has been flying continuously since that time, working as an instructor, doing cross-country flying on charter trips and flying the mail on the Pittsburgh-Cleveland line.

He was with the Pittsburgh Aviation Industries Corporation. Then for a year and a half he flew for the Main Aeronautics Co. of Pittsburgh, piloting their scheduled daily passenger and express plane from Greensburg, Pa., through Pittsburgh, Pa., and Huntington, W. Va., to Cincinnati, Ohio. They suspended operations last October, leaving poor Richard up in the air clutching Transport License No. 2506 and State of Pennsylvania Transport No. 25. He has 3,000 hours and a desire for employment. Outside of the increased hours, he tells me in a recent letter, he feels about the same as he did in the old days in Texas and Oklahoma before eating and aviation got together. They seem to be falling apart again, here and there. Still, the piano, steel, railroad, automobile and brokerage businesses aren't keeping any too good connection with the restaurants, either.

Anyone who recalls how Bettis Field, McKeesport, Pa., used to look before improvements were made will remember that with the wind from the southwest it was necessary to take off pointing straight towards the hangars and office buildings. The runway was not sufficiently long enough, however, for the ship to be able to get sufficient altitude to go over the obstructions, and it was necessary to turn either to the right or left of the field.

Dick Laughlin mentions this in his letter, and continues, "I was giving a student training in take-offs and landings. We got out to the end of the runway, pointed straight at the hangars and started to take off. The plane got into the air very nicely, and at an altitude of about ten feet, the student couldn't make up his mind whether to turn to the right or the left, and he simply shut off the throttle while he made up his mind! I was in the front cockpit of that student's plane and was able to get the gun back on just in time to make a vertical bank with one wing tip a few inches from the ground. We got safely out over the valley which always gives you plenty of altitude when you push off the edge of Bettis Field."

That reminds me of an occurrence in England during the war. The pupil had gone down to the far end of the field and had taken off toward the hangars. He rolled along in an old Morris Farman Shorthorn, but the Renault engine was not turning enough to get him off the ground. However, he had advanced his throttle fully and came charging across the field. When he got within about two hundred feet of the hangars, he apparently realized that he wasn't going to rise. I was standing there as he went by, and I never before saw such a look of intense suffering on anyone's face. He passed me, making approximately thirty-five miles an hour with only about five cylinders hitting, and yet he continued on for the center of the hangar and smashed up his own plane and three others that were sitting inside. We all rushed over as he climbed out of the wreckage and said, "Well, I just remember I should have switched off."



# 8,700,000 MILES since 1927! \*

Five years ago the first 24 Boeing Forties were put into mail-passenger service between Chicago and San Francisco. On this one route alone, operated by United Air Lines, this famous model has established a record of more than 8,700,000 miles of unflinching performance — another instance of Boeing construction years ahead of its time. . . . Boeing Airplane Company, Seattle, Subsidiary of United Aircraft & Transport Corporation.



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# NEW EQUIPMENT AND METHODS

## STAINLESS STEEL ALLOY

NEVASTAIN RA, a patented stainless steel alloy that resists corrosion, heat and wear has been announced by the Associated Alloy Steel Co. of Cleveland, Ohio. Developed to be mill processed and handled by the same methods as the mild forms of steel, to be deformed hot without causing undue strains upon machinery and to give full ductility at normal annealing temperatures, the alloy does not work harden to the same extent as other stainless steel alloys and responds readily to heat treatment. It is free machining and can be gas, electric arc, flash or spot welded without a tendency to grain growth.

## BEACON LIGHT CONTROL

A DEVICE that switches on rotating beacon lights of the Federal Airways System whenever it is dark enough to require lights has been developed by the Airways Division of the Aeronautics Branch, Department of Commerce. The instrument also turns off the current when lights are unnecessary. By adapting the principle of the photronic cell, or "electric eye," the device becomes a means for lighting beacons automatically whenever the amount of natural light registered on the instrument is less than 15 foot candles, and for turning off the current when the light exceeds that amount.

The cell is a highly light-sensitive disc,  $1\frac{3}{8}$  inches in diameter, which transforms light energy directly into electrical energy without the use of any auxiliary voltage. The life of the cell is believed to be practically unlimited and it is not subject to chemical or physical changes. In the Airways Division's instrument, three of the cells are mounted in a round metal case,  $5\frac{1}{2}$  inches in diameter, the face of which is protected by glass. It is on the tower of the beacon light, facing north, and is inclined slightly toward the sky, to receive a comparatively steady amount of light without direct sunlight.

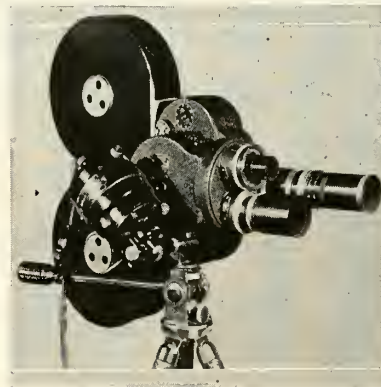
During the night, when the three cells receive little or no light, the switch remains closed and the beacon light operates continuously. At dawn, the light available to the photronic cells gradually increases, until it reaches 15 foot candles. There is then a lag of 45 seconds before the mechanism operates, to prevent the beacon from flashing on and off intermittently when the light received by the cells is fluctuating slightly in the neighborhood of 15 foot candles. When the light has advanced in amount to the required amount and the 45 seconds have passed, the electrical current generated by the cells operates through a relay

and transformer and opens the switch which darkens the beacon light. All the supplementary apparatus is contained in a metal box, 10 by 12 inches in size and four inches in depth, installed at the foot of the beacon tower.

An experimental instrument of this type has been installed for service tests at the Commerce Department's intermediate landing field, near Bowie, Md. If results obtained there are satisfactory, similar equipment will be installed along airway routes where local meteorological conditions make it essential for beacon lights to operate at certain times during daylight hours. Heretofore beacon lights have been switched on and off by astronomic time clocks, so adjusted that they will open or close the switches at sunrise and sunset each day.

## AERIAL MOVIE CAMERA

TO MEET special demands for airplane motion picture work and for outfitting scientific and exploring expeditions, the Bell & Howell Co. of Chicago, Ill., has arranged to equip its portable 35-millimeter Eyemo movie camera with an electric motor. An external film magazine carrying 400 feet of film also may be added. In airplane photography the motor feature is particularly desirable since the pilot can place the camera with



attached motor in an advantageous position and shoot pictures by remote control.

Any Eyemo camera employing a hand crank can be motor-equipped. The motor is mounted on one side of the camera, engaging in the hand-crank socket and running the film through at speeds of from 24 frames down to four frames per second, the speed being adjusted by the camera governor. The motor weighs  $3\frac{7}{8}$  pounds, making the combined weight of

the motor and camera  $12\frac{3}{4}$  pounds. When an external film magazine is not attached, the film is run from a 100-foot spool in the camera itself. If desired, the motor runs the entire 100 feet of film through without stopping.

Either a 12- or 110-volt motor can be adapted to the camera. The 12-volt motor is particularly practical for airplane work, since this current is available from the plane batteries. The motor is readily attached and detached. When it is not desired to use the motor, the camera can be operated by spring drive while held in the hand, or it can be set on a tripod and operated by hand crank.

## FIRE-FIGHTING EQUIPMENT

TWO NEW fire extinguishers, the Foamite Crusader and the "Childs" Model DS, have been announced by the American-LaFrance and Foamite Corp., of Elmira, New York. Both extinguishers are of the  $2\frac{1}{2}$ -gallon size and of "Monotype" construction, the entire dome and shell being drawn from a single sheet of special alloy known as Alfronze. There is no side seam and no dome seam, all riveted seams are eliminated and there is no dependence on solder for strength.

The extinguishers have a high ultimate bursting pressure and are light in weight. Other features include a new type of collar construction, which is hot-pressed to size in a die and is attached to the head of the extinguisher by a special process, resulting in strength and a more uniform texture; the discharge elbow is threaded and sweated into an extruded boss integral with the shell; the discharge hose is attached directly to the elbow and eliminates the need for a separate hose connector; the hose is attached to the elbow and nozzle by means of hose clamps so that it can be easily removed and quickly replaced.

A special patented discharge screen made of Monel Metal is used on the Foamite Crusader, eliminating the initial slug of raw solutions. A patented knife-edge stopple seat removes all tendency for the stopple to stick. Metered port openings in the inner tube allow the two chemical solutions to mix in such proportions as to produce a large quantity of foam. The extinguisher is designed to produce firefoam at the instant of inversion and to be effective at very low temperatures.

In the "Childs" Model DS extinguisher, several new features include the use of Pyrex glass for the acid bottle, which is mounted in a special spring wire cage, eliminating the danger of bottle breakage due to rough handling.

**METAL HOSE AND TUBING**

**TITE FLEX**, manufactured by Tite flex Metal Hose Co., of Newark, N. J., has been approved by the Department of Commerce for a fuel line on aircraft. Although extremely flexible, it is of all-metal construction, is pressure-tight for gasoline and oil and does not rely on a packed sliding joint to produce flexibility. The seam is permanently fixed and is free from any internal rubbing action. It is designed to show no appreciable deterioration after long periods of use, and the absence of organic material in the hose helps to insure the purity of the fluid conveyed through it, at the same time maintaining the original capacity of the tubing. Due to its diaphragm construction, Tite flex absorbs vibration within its own metal wall. When installed as a vibration joint between the fire wall and the engine on any fuel line, it gives added protection to the airplane.

The tubing may be made of various metals, the standard product being brass. The metal used is a special composition, made from selected materials, rolled and heat-treated. It is very thin, the thickness varying with the diameter of the tubing. The wall thickness can be increased in special applications requiring unusual pressures where the standard tube can not be used. The covering is of a tubular braid of flat, narrow bronze strips or a basket woven casing of fine bronze wire and is designed to protect the tubing, to restrict the bending to definite limits and to offer a predetermined resistance against twisting.

Obtainable in all pipe sizes from 1/8-inch to three-inch, the tubing is supplied in practically any overall length.

**PARACHUTE LANDING FLARES**

**THE Elgin National Watch Co.**, of Elgin, Ill., has taken over the national distribution of aviation flare and signal equipment manufactured by the International Flare Signal Co., Tippecanoe City, Ohio. One of the newest products of the company is a three-minute landing flare, which is packed in an all-metal flare case and hermetically sealed. It is designed to remain sealed until the contents are projected away from the plane by electrical ignition of a small powder charge within the case. The principles of the flare that permit moisture-proof closure of the flare case also eliminate the necessity for a friction ignitor. The flare may be released from a perpendicular or horizontal position. The effective life of the flare is prolonged indefinitely and the servicing cost is removed.

Operation of the three-minute flare is by remote control from the instrument panel. The switch is of the crash-proof type. The flare, which is furnished complete with mounting bracket, ready

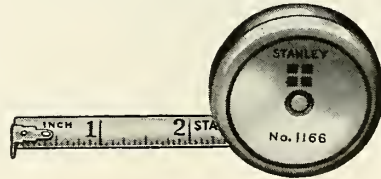
for convenient installation, may be wired into the regular lighting circuit, or if desired, a small battery similar to a radio C battery can be used to make the flare unit independent of the regular circuit, since only .3 of an ampere is required to actuate the special cartridges with which the flare cases are equipped. The parachute is made of special cloth, 12 feet square.

In addition to the three-minute parachute flares described, the line includes one-minute parachute flares, both for electric and pistol operation, as well as signal lights of various colors.

All of this equipment is approved by the Department of Commerce.

**FLEXIBLE RIGID STEEL RULES**

**TWO NEW** pull-push rules are being manufactured by The Stanley Rule & Level Plant, New Britain, Connecticut. Each rule has a six-foot steel blade that is both flexible and rigid, coiled in a



watch size steel case. The blade, which is graduated in inches and sixteenths, is always under control and can be easily set for any measurement. It has a hook on the end for measuring beyond arm's length.

**INSTRUMENT ILLUMINATION**

**M. GOULD BEARD**, engineer and test pilot for the American Airplane & Engine Corp., Farmingdale, N. Y., has originated a scheme for improvement in the illumination of airplane instruments. The numbers, index lines and pointer hands of the instruments are painted with a compound which becomes brightly

luminous in the presence of light rays from the ultra-violet end of the spectrum.

Electric light bulbs with ray filters absorb all rays except the ultra-violet rays, which are invisible to the human eye. These lamps are so located and arranged that the ultra-violet rays focus directly on the instruments to be illuminated. No other lamps and no lights with visible rays are present. Thus the pilot can read the indications on all instruments without dulling the keenness of his eye for perception in the dark. Furthermore, there is no reflection of yellow lights in the glass surfaces which form windshields and cabin windows around the pilot's cockpit.

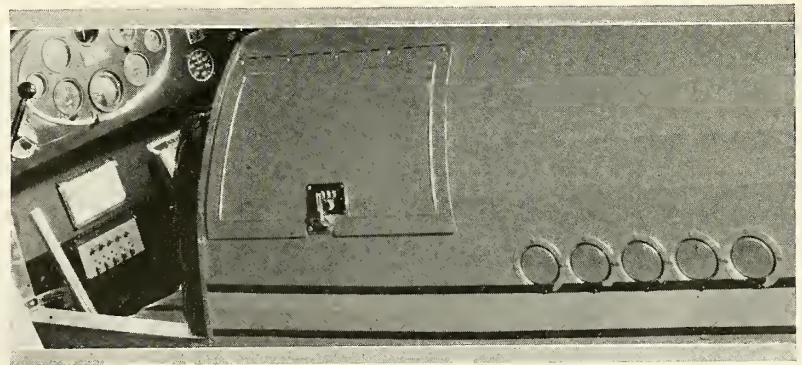
Preliminary tests have been made by the Westinghouse Lamp Co. and the General Electric Co. with favorable results.

**WHEEL PANTS LIFTER**

**HILL Aircraft Streamliners Co.**, of Cincinnati, Ohio, is manufacturing a new, patented device for lifting wheel pants, which eliminates the danger of the pants' catching or dragging on a rough or muddy field. It also lessens the possibility of the lodging of mud or stones in the streamlined forms, since raising them closes the gap between them and the tires, leaving no appreciable opening for the entry of such material.

This device, operated from the pilot's cockpit, enables him to raise or lower the pants at will; in the air he can obtain the maximum streamlining effect of the pants by dropping them to cover the wheel entirely, and in landing he can lift them sufficiently high to insure their clearing any ruts or other objects on the field.

The completed installation is light and compact, weighing slightly more than the regular installation brackets for pants. A locking lever, similar to a brake lever, is all that is required in the manipulation. The complete set of pants with installation brackets weighs approximately 25 pounds.



Cockpit of Waco airplane, showing five flare switches below instrument panel and three-minute International flares set in horizontal containers in the side of the fuselage

# COUZINET TYPE 33 TRIMOTOR

By

**Paul E. Lamarche**

ONE of the most outstanding long-distance flights to be accomplished this season by French aviators was made by Munch, Dévé and de Verneilh, who flew a type 33 Couzinet monoplane trimotor, *Biarritz*, from Istres, France, to Noumea in New Caledonia. The flight, which was the first to be made by a French airplane between France and Australia, extended over a distance of 21,500 kilometers, or approximately 13,360 miles.

The plane is a small low-wing monoplane designed by René Couzinet, a well known French aeronautical engineer. It is fitted with three inverted Gipsy engines, which develop 120 horsepower each at 2000 r.p.m. The monoplane has an all-wood construction, the full cantilever wing having spruce longerons and a plywood covering. The *Biarritz* has very clean lines, and all projections are faired in, the wheels of the landing gear and the tail wheel being enclosed in streamline casings. The fin of the vertical empennage is a prolongation of the top of the fuselage, which tapers towards the tail. Fuel is carried in seven wing tanks, which have a total capacity of 2,190 liters, sufficient to give the monoplane a range of 5,850 kilometers at cruising speed. The plane is completely equipped for long-distance flights and night flying and carries a short-wave radio transmission set.

On the trip to New Caledonia, exceptionally fast time was made, only twenty-nine days being consumed, despite numerous stops and delays due to bad atmospheric conditions, flooded fields and desert sand in the carburetors. Only twenty-eight hours had been flown in the plane before the flight to New Caledonia was started.

## Specifications

Span .....	53 feet
Length .....	38.5 feet
Height .....	9 feet
Total area.....	370 square feet
Maximum chord.....	9.45 feet
Minimum chord.....	5.05 feet
Area of horizontal tail.....	59 square feet
Area of rudder.....	12.25 square feet
Weight, empty, equipped....	3,860 pounds
Normal flying weight.....	6,850 pounds
Wing loading.....	18.5 lbs. per square foot
Power loading.....	18 lbs. per horsepower
Take-off run.....	1,640 feet
Power .....	360 horsepower
Cruising speed.....	124.5 miles per hour
Range .....	4,250 miles

## RECENT PATENTS

THE following patents of interest to readers of AERO DIGEST recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, 1343 H Street, N.W., Washington, D. C., at the rate of twenty cents each. State patent number and inventor's name when ordering.

Compressed air propulsion means for aircraft. George S. Mittelstaedt, Brooklyn. (1,852,086)

Aircraft landing gear. Alex F. Arcier, Dayton, Ohio, assignor to Waco Aircraft Co., Troy, Ohio. (1,852,099)

Airplane. Carl V. Johnson, South Bend, Ind., assignor to Bendix Research Corp. (1,852,116)

Streamline boot for airplanes. Kenneth M. Ronan, Wayne, Mich., assignor to Manning & Co., Chicago, Ill. (1,852,129)

Resilient coating for aircraft. Edmund B. Cairns and John A. Grimes,

Naugatuck, Conn.; Grimes assignor to Naugatuck Chemical Co., and Cairns assignor to Cairns Development Co., Wilmington, Del. (1,852,146)

Airplane. Arthur V. Kinsel, Los Angeles, Calif. (1,852,167)

Composite control surface for airplanes. Joseph Blondin, Los Angeles, Calif. (1,852,199)

Device for varying the pitch of propellers. Axel O. Fabrin, Memphis, Tenn. (1,852,204)

Airplane frame. Robert G. Huggins, Tulsa, Okla. (1,852,208)

Landing gear. Louis Breguet, Paris, France. (1,852,230)

Multitube parachute ejector. Ernest V. Stone, Long Beach, Calif. (1,852,439)

Variable-pitch propeller mechanism. John R. Zipay, Pittsburgh, Pa. (1,852,499, 1,852,500 and 1,852,501)

Airplane wing structure. Lessiter C. Milburn, Cleveland, Ohio, assignor to Glenn L. Martin Co. (1,852,622)

Propeller for aircraft. Frank A. Ringwald, Jr., Chicago, Ill. (1,852,626)

Combination landing gear, stabilizing float and revolving bumper for hydro-airplanes. Harvey A. Beilgard, Los Angeles, Calif. (1,852,691)

Airplane brake. Andrew R. Baggardy, Portsmouth, Va. (1,852,912)

Airplane. John Hill, West Springfield, Mass. (1,852,927)

Dirigible airship. John H. Tyler, Los Angeles, Calif. (1,852,987)

Cowling fastener. Robert Anderson, West Los Angeles, Calif., assignor to Douglas Aircraft Co., Santa Monica, Calif. (1,853,025)

Control means for mooring masts. Wilfred V. N. Powelson, New York, N. Y., and Warren Travell, San Bernardino, Calif. (1,853,081)

Self-stabilizing airship. Wilfred V. N. Powelson and Warren Travell (1,853,082)

Rudder control means for airships. Wilfred V. N. Powelson and Warren Travell. (1,853,145)

(Continued on following page)



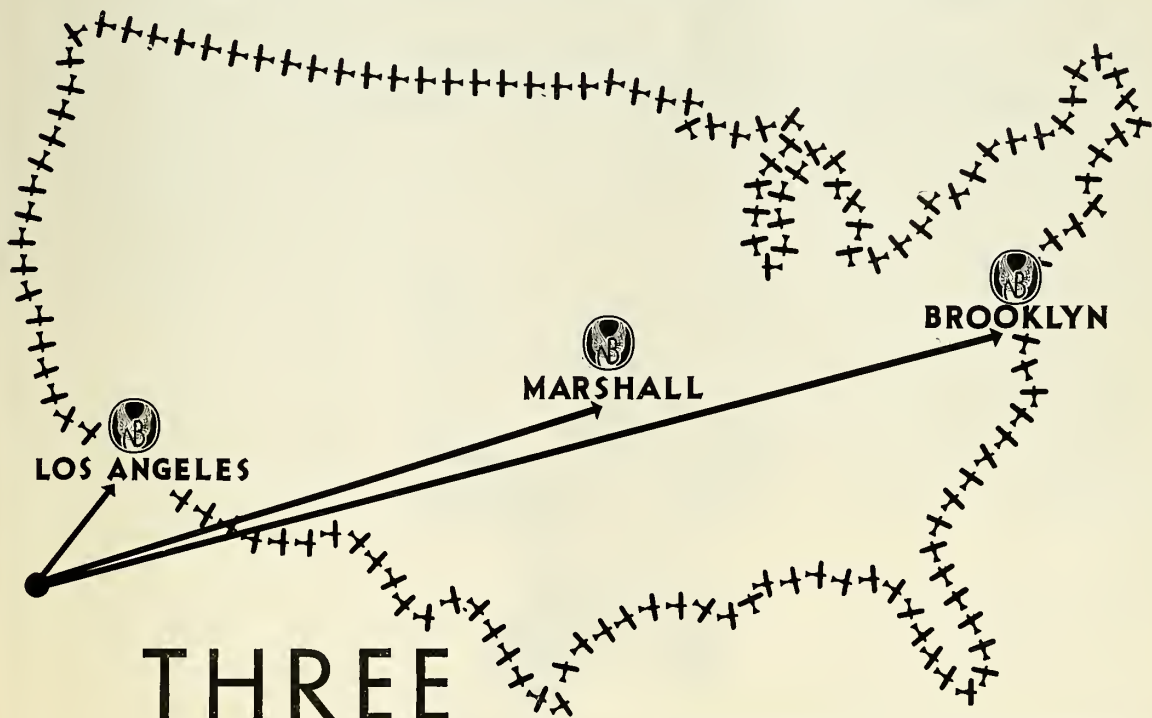
The French Couzinet 33 "Biarritz" powered with three 120 h.p. "Gipsy" inverted engines



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(Continued from preceding page)

Landing gear for aircraft. Alfred Schwarz, Upper Montclair, N. J., assignor to Wing Aeronautical Corp., New York, N. Y. (1,853,232)

Stabilizing device for airships. Alfred Schwarz, assignor to Wing Aeronautical Corp. (1,853,233)

Aircraft landing gear. Paul Maiwurm, San Diego, Calif. (1,853,312)

Airplane window construction. James M. Packer, Colorado Springs, Colo. (1,853,317)

Sunken light for airplane fields. Thomas J. Rogers, Minneapolis, Minn. (1,853,321)

Propulsion and steering means for aircraft. Stan L. Kelly, Los Angeles, Calif. (1,853,361)

Airship. Wilfred V. N. Powelson and Warren Travell. (1,853,376)

Airship mooring means. Archibald Hall-Brown, Purley, and Edwin W. Jones, Lincoln, England, assignors to Babcock & Wilcox Co., Bayonne, N. J. (1,853,404)

Strut construction. Giuseppe M. Bellanca, New Castle, Del. (1,853,492)

Airplane propeller. Rolla B. Ferrey, Los Angeles, Calif. (1,853,607)

Aircraft. John Weiss, New York, N. Y. (1,853,647)

Buoyant airplane. Maciej M. A. Babula, Greenwich, Conn. (1,853,653)

Aircraft course calculator. Otto Mueller, Detroit, Mich. (1,853,740)

Method of, and apparatus for, berthing airships. Wilfred V. N. Powelson and Warren Travell. (1,853,777)

Parachute mounting for airplanes. Rocco Monteleone, Jersey City, N. J. (1,853,874)

Motor mounting. Tage C. Olesen, Northville, Mich., assignor to Stinson Aircraft Corp. (1,853,991)

Airplane. Herbert Koener, Habana, Cuba. (1,854,043)

Method and means of protecting aircraft. Bernard J. Pollard, Detroit, Mich. (1,854,220)

Air screw drive. Benjamin C. Carter, South Farnborough, England. (1,854,329)

Metallic construction of aircraft. Gustave Delage, Paris, France. (1,854,330)

Airplane engine arrangement. Giuseppe M. Bellanca. (1,854,364)

Airplane. Glenn A. Berry, San Francisco, Calif., assignor to Berry Aircraft, Ltd. (1,854,365)

Apparatus for determination of drift by aircraft. Ralph F. Wood, U. S. Navy. (1,854,437)

Airplane wing construction. George E. Barnhart, Pasadena, Calif. (1,854,444)

Landing and taking-off mechanism. Nicolas F. Thommes, Detroit, Mich. (1,854,494)

Aircraft. Nicholas J. Medvedeff, Scarsdale, N. Y. (1,854,520)

Adjustable wing and stabilization con-

trol for airplanes. Ernest E. Sorrell, Springfield, Mo. (1,854,527)

Airplane propeller. Anthony B. Fortener, Dayton, Ohio. (1,854,611)

Airplane propeller, James A. Calby, Montrose, Pa. (1,854,644)

Airplane air pressure redistribution means. James V. Martin, Garden City, N. Y. (1,854,706)

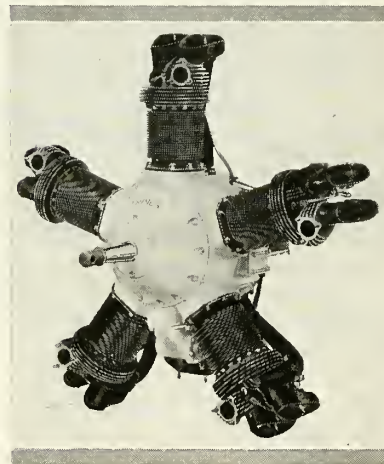
Compressed air parachute. Joseph R. Palagonia, Glendale, N. Y. (1,854,996)

Airplane. John Dill, Woodside, N. Y. (1,855,012)

Aircraft tail chassis. Knut Henriksen, Garden City, N. Y., assignor to Curtiss Aeroplane & Motor Co. (1,855,020)

Airplane. Oscar Alvistur, Oakland, Calif. (1,855,084)

Steering aileron or elevator mechanism for aircraft. Robert A. Bruce, Geoffrey T. R. Hill and John W. Ratcliffe, Yeovil, England, assignors to Petter's, Ltd. (1,855,093)



## Kinner R-5 Engine

A RECENT addition to the line of aircraft engines now being manufactured by the Kinner Airplane & Motor Corp., Ltd., of Glendale, Calif., is the Model R-5 five-cylinder, 160-horsepower engine. This engine successfully passed the Department of Commerce test and was granted Approved Type Certificate No. 77 with an official rating of 160 horsepower at 1975 r.p.m. Weighing only 305 pounds, it is the lightest aircraft engine in its power class manufactured in the United States.

The overall diameter of the engine is 45 $\frac{3}{4}$  inches, with a total overall length of 32 $\frac{5}{16}$  inches. Since the bolt circle for the mounting ring is identical with that of the type B-5 engine, aircraft manufacturers desiring an engine of higher horsepower for ships already equipped with

the B-5 can effect the installation with no changes in the mounting ring or cowling.

The R-5 adheres to the characteristic Kinner design in employing a separate camshaft for each of the five cylinders. Each camshaft includes a simple spur gear driven by pinion gear on the rear end of the crankshaft at one-half the engine speed. Spur type magneto drive gears are operated by the cam gears. Oil pressure and scavenger pumps are actuated by shafts keyed into slots in the ends of the third and fourth camshafts, respectively.

Aluminum alloy cylinder heads are secured to forged steel cylinder barrels by 16 studs each and are removable, thus providing for economical replacement of either part separately. There are two overhead valves per cylinder actuated by a valve mechanism completely enclosed with grease-tight rocker arm boxes and push rod enclosures. Aluminum alloy pistons have three compression and one oil ring each, located above the full floating piston pins.

Nickel steel connecting rods consist of master rod and four link rods and are machined and polished over their entire surface. The nickel steel crankshaft is machined and ground all over and is counterbalanced with extreme care. It is carried on two plain babbitt bearings with ball-thrust bearing.

The aluminum alloy crankcase consists of three sections. The main part carries cylinder base pads, generator and fuel pump mounting pads, induction manifold, rear main bearing and front bearings for cam and accessory drive shafts. The front section holds the front main bearing. The rear carries the oil pump, magnetos, rear bearings for cam and accessory drive shafts.

An added feature of the new engine is that oil passages are contained within the crankcase, eliminating all external oil lines with the exception of connections between the oil pump and oil tank. High-pressure lubrication at from 90 to 100 pounds is provided by simple gear pump, with a scavenger pump for returning oil from crankcase to tank. Oil is led through the passages in the crankcase assembly to the front main bearings, thence through the hollow crankshaft to the master rod and rear main bearing. Pressure lubrication also is supplied to link rod pins, bushings and front camshaft bearings. Cylinder barrels, pistons and other parts receive adequate lubrication from oil spray. The oil sump is constructed to accommodate a Cuno oil cleaner.

Provision has been made for two standard U. S. Army gun synchronizer drives, double tachometer drives, fuel pump drive and generator drive, if desired.

Among the users of the R-5 are the Kellett Autogiro Corp., the Pitcairn Autogiro Co. and the Waco Aircraft Co.

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**INFORMATION:** Employers or students can best form their own opinion of Boeing standards from the bulletin of courses. It gives full details regarding enrollment requirements, costs, facilities, etc. Fill in and mail the coupon for a copy and compare with any other school.

*Next Regular Enrollment, July 5*

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# Boeing XP-936 Pursuit Airplane

THE latest Army pursuit airplane, a Boeing XP-936, rated among the fastest in the world, has arrived at the Materiel Division for inspection and performance testing. This single-seater all-metal monoplane incorporates the most modern features of design known to aviation. It is a radical departure from the existing airplane used for combat purposes. The fuselage is a clean, highly streamlined monocoque structure, the semi-low wing having a smooth metal skin covering. This wing consists really of two parts, a stub which is integral with the fuselage and the wing proper.

The landing gear is a single-strut, vertical, wire-braced type with the shock-absorbing element carried through the wing stub to the fuselage. Landing gear struts and wheels are provided with streamline fairings. The wheels are the first of a new streamline type.

The ailerons and rudder are unbalanced, whereas the elevators have the overhung type of balance. The stabilizer is fixed, the longitudinal balance being



Army Air Corps photo

Boeing XP-936, newest all-metal pursuit plane of the Army Air Corps

obtained by means of trailing edge stabilizing flaps on the elevators.

The power plant is a new supercharged Pratt & Whitney *Wasp* engine. The supercharger forms an integral part of the power plant proper, similar to the blower on the commercial types of this engine, which should make possible speeds greater than heretofore attained at high altitudes, by air-cooled installations.

This airplane represents a record in the production of an experimental model, less than six months having transpired since the design was conceived and the first drawing made.

The external form of the models was the same in each case but the longitudinal section inside differed in profile. The experiments carried out for the same Reynolds number gave notable differences in drag, showing the importance of the internal form.

The lift and drag coefficients of the usual fuselage are compared with those of the experimental tubular fuselage, indicating that better results may be obtained with the tubular fuselage. When the fact is considered that the operation of a propeller in the tubular fuselage produces a negative drag on that fuselage, the superiority of the tubular fuselage, compared with the normal type, is seen.

*Paper presented before the Aerotechnical Section of the Italian Association for the Advancement of the Sciences.*

## DIGEST OF FOREIGN TECHNICAL ARTICLES

### Elsa Gardner

#### AIRPLANE PERFORMANCE

The Combined Performance of Airplane Wing and Driving Gear (Über das Zusammenwirken von Flugwerk und Triebwerk) M. Schrenk Zeitschrift fuer Flugtechnik und Motorluftschiffahrt, Vol. 22, Nos. 23 and 24, December 14 and 28, 1931, pp. 696-702 and 721-727, 25 figs.

BASED on a comparatively simple determination, curves for airplane-propeller performance and r.p.m. are combined with a power output curve to give a complete performance diagram. For the selection of a propeller, the increase in r.p.m. with maximum speed is determined except for take-off and climb. On a throttling parabola the advance and efficiency are constant, the r.p.m. being proportional to the airplane speed and the propeller performance curve is built up on this parabola. The best operating point of the "compromise propeller" coincides with the point of best fineness ratio for horizontal flight, and the best throttling parabola passes through the point of best fineness ratio. The best operating point of the propeller performance curve lies on it. It is the backbone of the whole group of curves.

The power reserve is measured on the best throttling parabola and expressed in the reserve quantity. It controls all flight performance. With power reserve, the trajectory speed improves the quickest climbs and usually is at or above the best gliding speed. The aerodynamic value improves with fixed power reserve as the angle of inclination and rate of speed fall off, which is especially to be considered in take-off. To the normal engine, the adjustable propeller brings a perceptible gain for climbing ability and to altitude engines, a decided superiority in rate of climb.

*Report of the Deutschen Versuchsanstalt fuer Luftfahrt.*

#### TURBINE WING

The Aerodynamic Efficiency of Tubular Fuselages (L'efficienza aerodinamica di fusoliere tubolari), L. Stipa, L'Aerotechnica, Vol. 12, No. 3, March, 1932, pp. 320-350, 27 figs.

RESULTS of experiments on a series of tubular fuselage models, known also as the turbine wing (described in previous issues of the magazine and abstracted in AERO DIGEST) are reported.

#### HIGH TIP SPEED PROPELLERS

Wind Tunnel Experiments on High Tip Speed Airscrews, A. S. Hartshorn and G. P. Douglas, (British) Aeronautical Research Committee—Reports and Memoranda No. 1438, July 1, 1931, 12 pp., 8 figs.

A GENERAL investigation of the properties of high tip speed propellers at the Royal Aircraft Establishment is continued in the present report. In the previous investigation, torque grading measurements were made on steel propellers, each two feet in diameter, with a thin conventional blade section 0.082c in thickness and with a low-camber Joukowski blade section 0.10c in thickness (R.A.F. 28). The present report gives results of similar measurements for a still thinner conventional section, 0.06c in thickness. Lift and drag coefficients were determined from slip-stream analysis, and drag measurements of the thrust were made on propellers. Lift values of the thin section were found to maintain a higher speed than those of any of the thicker sections previously tested. For this propeller, a fairly well defined flutter region was found in which running was not possible.

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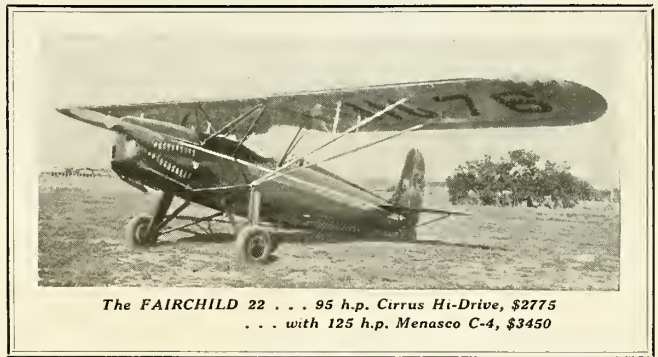


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# FAIRCHILD AIRPLANE SALES CORP.

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(Continued from preceding page)

It is said that the screening effect should begin only beyond a determined velocity of the wind. It is proposed to regulate the resistance of the friction on the propeller, and the static couple is studied in order to demonstrate that it is possible to start the propeller at the time desired. The theoretical and practical limits of the screening effect are determined.

#### DIESEL ENGINE STRESSES

**Diesel Connecting-Rod Stresses, O. Thornycroft and B. C. Carter. Aircraft Engineering, Vol. 4, No. 37, March, 1932, pp. 69-70, 2 figs.**

**E**FFECTS of rapid rise of cylinder pressure on connecting-rod loading in high-speed Diesel engines are discussed. It is shown that the conditions approach those of impact and, in addition to the primary stresses in the connecting rod due to gas pressure and reciprocating inertia, there are stresses depending on the natural period of vibration of the piston and connecting-rod system, on the time period of rapid pressure rise and on the time rate of pressure rise.

The results of tests made in a hydraulic press to determine the compressibility of a connecting rod and piston belonging to an oil engine, in which failure of a connecting rod had occurred, are described. Impact effects are analyzed and the harmonic variation of load is illustrated. The main results of an analysis for radial engines are given, taking into account the mass associated with the crankpin, the big-end mass and elastic yielding of the crankpin in relation to the main mass of the engine.

#### NACELLE INTERFERENCE

**Drag and Interference of a Nacelle When Installed on the Upper Surface of a Wing, W. G. A. Perring, R. N. C. and C. Callen. (British) Aeronautical Research Committee—Reports and Memoranda No. 1414, September, 1930, 24 pp., 18 figs.**

**R**ESULTS of tests are described which were undertaken to investigate the drag and interference of a nacelle when placed on or above the upper surface of a monoplane wing. The influence of the nacelle on the drag was determined with and without a fuselage in position, and in a few of the tests, the effect of the propeller slipstream on the drag was measured.

The authors recommend that when a nacelle is installed above and clear of the wing, its axis should be at least  $1\frac{1}{2}$  nacelle diameters, but preferably two diameters, above the wing. In the case of a nacelle mounted immediately on the wing, the nacelle axis should coincide with the wing chord, but if it is desired to mount the nacelle with its axis above the chord, the height above the chord should not exceed about 0.4 nacelle diameters.

#### DETONATION

**The Phenomenon of Detonation in an Internal Combustion Engine and the Anti-Knock Fuels (Il fenomeno della detonazione dei motori a scoppio e gli antidetonanti). A. Izzo, Rivista Aeroautica, Vol. 8, No. 4, April, 1932, pp. 81-115, 13 figs.**

**D**EFINITIONS of efficiency and a study of compression in an internal combustion engine are taken up as an introduction to the discussion of detonation. The author points out the importance of increasing the thermal efficiency and the necessity for using greater compression ratios. He explains the theory of detonation and the means taken for its elimination. Arguments for fuels of benzene and alcohol are quoted and the problem of employing less inflammable fuels in aviation discussed. A device for the photographic study of explosion waves under pressure is described. The various theories of Ricardo, Laffite, Callendar, King and others are taken up in detail, and the analytical research of anti-knock compounds for fuels is dealt with.

The discussion of ionization and velocity of combustion and a complete bibliography on detonation are to be given in a subsequent issue of the magazine.

#### ALUMINUM AND MAGNESIUM ALLOYS

**The Institute of Metals, Engineering, Vol. 133, Nos. 3432, 3453, 3454, March 11, 18 and 25, 1932, pp. 321-323, 331-339, 353-355 and 364-365.**

**A**CCORDING to this report of the twenty-fourth annual general meeting of the Institute of Metals, many papers of interest to aeronautical engineers were presented. One of principal interest was entitled "Intercrystalline Corrosion of Duralumin," by A. J. Sidery, K. G. Lewis and H. Sutton, who described the results of experiments carried out to determine the influence of overstrain in tension or compression, and of certain modifications of heat treatment, on the tendency of duralumin to develop intercrystalline corrosion. "Magnesium Alloy Protection by Selenium and other Coating Processes," by G. D. Bengough and L. Whitby, described research to develop a process for the protection of magnesium-rich alloys, particularly those used in aircraft construction, against corrosion by the atmosphere and chloride solutions, especially sea water spray.

"Age Hardening of Some Aluminum Alloys of High Purity," by C. H. Desch, tells the results of age hardening a series of alloys made with high-purity aluminum containing four per cent copper, to which iron, silicon and magnesium had been added. Other papers included: "Influence of Temperature on the Elastic Behavior of Various Wrought Light Metal Alloys," F. Bollenrath; "Thermal Conductivity of Some Non-Ferrous Alloys," D. Hanson and C. E. Rodgers; "Note on the

Interaction of Aluminum and Water Vapor," R. Seligmann and P. Williams; "Observations on Pressure of Fluidity of Annealed Metals," H. O'Neil and H. Greenwood; "Symposium on the Testing of Castings," led by W. Rosenhain, and the Third Report on the Relative Corrodibilities of Ferrous and Non-Ferrous Metals and Alloys, Results of Three Years' Exposure at Southampton Dock, J. Newton Friend.

#### RACING ENGINE INSTALLATION

**The Installation of a Racing Engine, J. Pettitt-Herriot. Aircraft Engineering, Vol. 4, No. 38, April, 1932, pp. 91-95, 9 figs.**

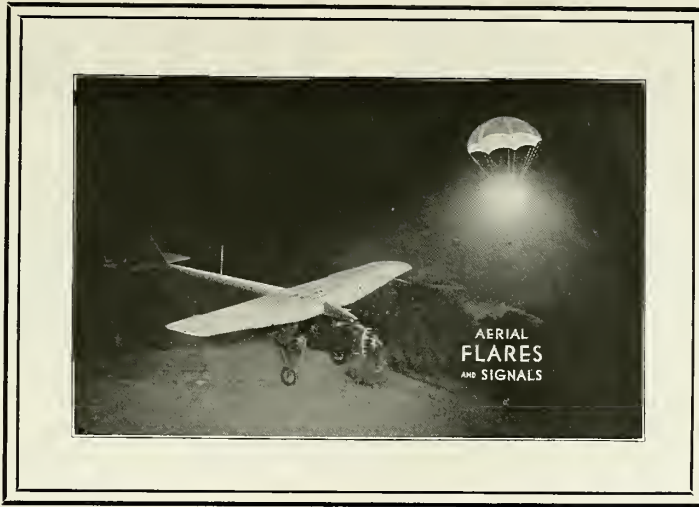
**T**HIS description supplements previous articles in the magazine (and abstracted in AERO DIGEST) on the Rolls Royce R racing engine for the Schneider Trophy Contest. It deals with the installation of the engine in the seaplane and takes up some of the difficulties met with and overcome during the work of preparation at Calshot. As the majority of the problems were connected directly or indirectly with the gasoline, oil or water systems, a full description of the working of each of these systems is given at the outset.

The effect of the centrifugal force when turning at high speeds had a very marked effect on the gasoline system, the increased centrifugal loading having a tendency to suck open the relief valves. A means of overcoming this tendency by fitting a small valve in the top of the relief-valve chamber is discussed, and a method outlined which was adopted for preparing machines for the actual contest so as to insure a minimum amount of engine running after the final engine had been installed. The changes are described which were necessitated by the power increase over that of the standard engine as used in the race.

#### MANOMETER

**A Simple Tilting Manometer for Rapid Reading, J. Small. (British) Aeronautical Research Committee—Reports and Memoranda No. 1436, October, 1931, 4 pp., 2 figs.**

**A**TILTING manometer is described which indicates changes in head of the order of 0.0001 inches of water and is thought to be capable of still further refinement. It consists of two limbs of a U-tube, one held rigidly and the other capable of being moved vertically by means of a micrometer arrangement, the two limbs being connected by means of rubber tubing. On the surface of the water in the fixed limb a fixed float is located which operates a small optical lever. Changes of pressure causing a deflection of the beam of light reflected from the mirror of the optical lever are balanced in the usual way by means of appropriate vertical movements of the free limb until the beam is restored to its initial position.



# AERIAL FLARES AND SIGNALS

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# THE AIR SERVICES

## *Army Pilots Test Radio Frequency*

IN order to determine the exact amount of frequency change due to varying temperature conditions, Lieutenants Jos. A. Brier and A. E. Livingston, of the 95th Pursuit Squadron, March Field, recently conducted experiments at United Airport, Burbank, California. Equipped with oxygen tanks which were utilized at 16,000 feet and above and S.C.R. 183 radio receiver and transmitter, Lieutenant Livingston flew to 23,000 feet in an Army Air Corps P-12-E Boeing Pursuit plane.

During the entire flight constant communication was maintained with Lieutenant Brier in a similar plane on the airport, also equipped with S.C.R. 183 two-way radio set. Temperature on the ground was 62°, and at 23,000 feet it was 21° below zero. It was definitely proved that the frequency shift due to temperature change was so minute that the broad tuning of the receiver would keep all transmitted signals audible if the distance between sets was within the prescribed range laid down by Government requirement specifications.

## *"Los Angeles" to be Retired*

THE airship *Los Angeles* has been ordered decommissioned and retired at Lakehurst on June 30. Received as reparations from Germany after the World War, the dirigible is now eight years old. Two years ago a Naval board of inspection placed the possible life of the airship at from two to four years. A sum of \$280,000 yearly will be saved by the Navy in decommissioning the dirigible. Its crew will be transferred to the general Naval service.

## *Boeing Busy on Service Order*

FULL production of fifty-four Navy F4B-4 fighters is now under way at the Boeing Airplane Company of Seattle, and the first of these Wasp-powered carrier fighting airplanes is scheduled for completion next month. Although generally similar to the F4B-3 fighters, twenty-one of which were delivered by the Boeing plant in January, the F4B-4 planes will have several improvements.

## *Plan "Macon" Completion Soon*

THE entire metal framework of the *Macon* should be completed by July 1, according to the Goodyear-Zeppelin Corp. Placing of the outer cover on the ship began last month, starting at the tail and working toward the nose. Although no specified time has been set for the completion of the ship, indications

are that it will be ready for trial flights about January 1, 1933. The *Macon*, after its formal acceptance by the Navy, is to be based at Sunnyvale, Calif., where a huge dock is now under construction.

Following the completion of the *Macon* it is hoped that a commercial airship program for the United States may be launched. The projected commercial airships would be slightly larger than the *Akron* and *Macon*, probably with a gas capacity of 7,500,000 cubic feet, a capacity of a million cubic feet greater than that of either of the Navy ships.

## *Aid to Bombing Instructors*

VP SQUADRON 1 at Pearl Harbor, Hawaii, has evolved a "bombing teacher," which consists of a platform about fourteen feet high superimposed on an old electric truck, geared down by means of a system of belts and pulleys. The top of the platform is rigged similarly to the bow of a PK-1 seaplane and a regular bomb sight installed. The entire platform is driven slowly along the floor by a pilot who manipulates his controls as directed by the bomber through the medium of a pilot director system. The target is towed along the floor by means of a towline which is wound on a drum. The latter is actuated by a pulley and belt system driven by an electric phonograph motor.

This target arrangement system gives any desired rate of drift. Bombers become proficient in the use of the bomb sight before starting air training.

## *Squadron Adopts Insignia*

THE 57th Service Squadron, Selfridge Field, Mich., has adopted an insignia that recently was approved by the War Department. It is a black-and-white conventionalized winged mechanical head, under the chin of which is a black disc charged with a white spur gear.

The head represents knowledge of mechanics; the wings, having the appearance of a worm gear, denote aeronautics, while the spur gear signifies service and maintenance. The white symbolizes sincerity, and the black, the foundation of experience.

## *Field Street Light System Installed*

SELFRIDGE FIELD, Mt. Clemens, Mich., has a new street lighting system, installed as a part of the construction program at the field. The electric system is entirely underground and includes street lighting and service connections to all buildings on the post.

## *Open Canal Zone Field*

ALBROOK FIELD, Panama Canal Zone, was officially opened last month. The 44th Observation Squadron from France Field, under the command of Major E. A. Lohman, was ordered to occupy the field as soon as possible after the opening.

It is expected that work will be in progress for the next year and a half to complete the field. Three hangars have been started and will be finished some time this month. Flying will be carried on from Albrook until the wet weather makes the field impossible for landing, when operations will be transferred to the field at Fort Clayton. Eventually surfaced runways will be installed for the rainy season operation.

## *Luke Field Has New Chapel*

A NEW chapel, seating approximately 150 persons, was completed recently at Luke Field, Ford Island, Hawaii. The chapel is the result of cooperation between the quartermaster's department, the post educational and recreation officer and the personnel of the field.

## *Langley Field Club House*

ORGANIZATION of the Non-commissioned Officers' Club at Langley Field, Va., has been promoted since the erection of a new club house. A board of governors has been selected, constitution and by-laws drawn up and plans for furnishing the club house formulated. The club house is a one-story structure, built along the lines of English country houses. A lounge, a card room, reading room, dining hall and kitchen constitute the principal features.

## *Navy Uses Portable Armory*

A NEW portable armory is in use by the Naval air service at Quantico, Virginia. The combination gun cabinet and workbench is equipped with a barrel vise for the Lewis and Browning guns, a three-inch vise and a fixed stock for adjusting the Lewis gun before placing it on the plane. A drawer for spares and one for tools are located at the top of the cabinet front, and the two-door bottom recess is fitted with racks for extra guns and parts. The front of the cabinet is drilled for an axle and two ten-inch rubber-tired wheels that permit the easy moving of the cabinet when lifted off the rear legs. The new bench top also will accommodate a Lewis and Browning loading tool that makes the new device an independent armory.

(Continued on following page)

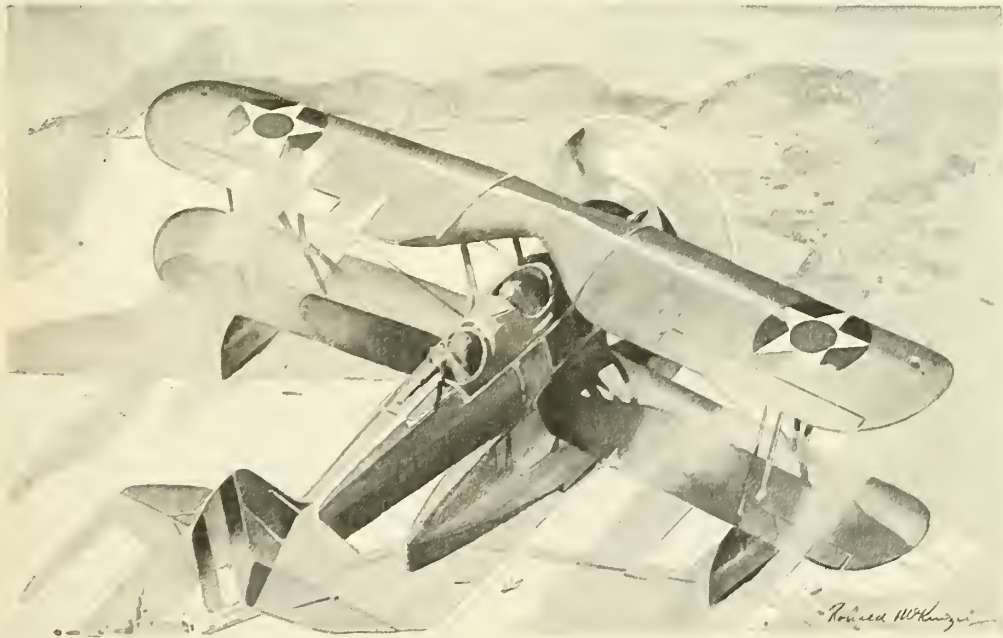




# When the CORSAIR goes Abroad

Long hours of rigorous flying in the far parts of five continents have made the Corsair truly a plane of the world. As seaplanes and landplanes Corsairs have inspired enthusiastic praise in half a dozen languages. Pilots and operating officers find in the Corsair the perfect combination of structural stamina, exceptional performance and reliability that discounts poor landing fields or rough water, and forbidding

mountains or desolate plains below. They have found the Corsair a truly all-purpose airplane—efficient for fighting, observation and bombing—the one plane which meets all their needs. Chance Vought Corporation, East Hartford, Connecticut. Division of United Aircraft & Transport Corporation. Sole Export Representative: United Aircraft Exports, Inc., 230 Park Avenue, New York, U. S. A.



**CHANCE VOUGHT CORPORATION**

(Continued from preceding page)  
**Receives Distinguished Flying Cross**

**SERGEANT FRANK D. NEFF**, 2nd Balloon Company, Air Corps, recently was awarded the Distinguished Flying Cross for heroism while participating in an aerial flight at Pope Field, Fort Bragg, N. C., on the night of December 3-4, 1931. During a severe wind and rain storm, the Army dirigible TC-71 broke from its moorings while preparations were being made by the crew to start the engines and cast off to ride out the storm. Sergeant Neff succeeded in starting the right engine, but was unable to start the left from within the car. Realizing that the airship was not under full control and in great danger of being wrecked and the crew injured, he immediately discarded his parachute and climbed out of the car on to the unprotected outrigger of the wildly plunging dirigible. Working in the darkness in this perilous position, he succeeded in hand-cranking the left engine, thereby bringing the airship under full engine control.

**New Wright Field Laboratory**

A NEW engine torque stand laboratory has been constructed at Wright Field, Dayton, Ohio, to replace the torque stands destroyed by fire last year. In planning the new laboratory, special effort was made toward as great a reduction of noise, vibration and fire hazard as possible. The building resembles a series of square concrete stacks, forty feet high, joined by enclosed passages. The materials employed are reinforced concrete and steel. Except for a few doors and some bomb-proofing, no wood is used, even in the interior.

Centered between the stacks are seven torque stands, six for the use of the power plant branch for the endurance testing of engines and one for the use of the aircraft branch for the testing of propellers under installation-on-engine conditions. The engine stands are of the fixed type, no provision being made for determining torque reaction. Power determinations are accomplished on the dynamometers. Each engine support pier is a huge block of concrete sunk twenty feet into the ground, completely encased in cork to prevent transmission of vibration to any part of the building, the jointure at the floor being filled in with tar, used because of its resiliency. These blocks are completely independent of the rest of the construction. The old torque stand supports were not independent and transmitted serious vibrations to the walls of the engine room and to the operators. Each torque stand is placed in its own engine room, where a clearance for swinging a propeller of eighteen-foot diameter or test club prevails. To protect the walls around the engine, so that in case of engine failure, parts of the engine or propeller will not crash into the

concrete, lengths of red oak, laid edge to edge, form a bomb-proof. These are covered with aluminum.

The great stacks are for the reduction of noise outside the building and are so constructed, one about each engine room, that the sound waves can find an outlet only through the top of the stack, which is open to the sky. Pilots have commented on hearing this roar, 500 feet high, against the noise of their own engines and propellers.

Between each two engine rooms is an operator's room, used for observing the engine during tests, with very thick walls of reinforced concrete and a vibration-deadening insulation of heavy cork. Glass observation windows on either side look into the two engine torque rooms. Twin installations of instruments and controls for conducting tests and recording observations are placed on the wall near these windows. Devices are installed for measuring engine pressures, temperatures, fuel flow, oil flow, fuel consumption and engine speeds.

Small rooms within the operating rooms contain gasoline and oil supply tanks for supplying and weighing the oil and gasoline used by the engines under test. These are provided with fire-proof drop doors separating them from the operators' rooms in emergency. Two independent fuel systems are provided in order that engines may be run simultaneously on different fuels without any intermixing or change of fuel characteristics. These tanks hold only amounts necessary for the uses of the occasion and are filled by pumps from tanks outside the building. The oil storage building is located just in front of the torque stand laboratory.

**Try to Perfect Long-Range Firing**

ELABORATE equipment recently installed in a Douglas amphibian in Hawaii for the correction of long-range artillery fire has proved a success. Intricate yet rugged, these instruments cover

all phases of artillery adjustment work. The splash of the shell is noted, distance from the target is computed and the vertical angle from the plane and its true bearings are determined. This information is radioed back to headquarters, and meanwhile three radio beams intersecting on the plane have fixed its position at sea. These separate groups of information are plotted together, and in a very short time the necessary corrections are in the hands of the battery commander.

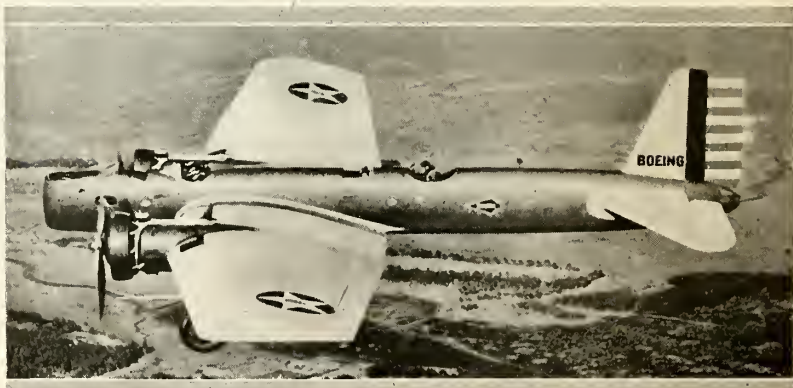
As these experiments progress, it is believed that by sighting the target and using this information, together with the accurately determined position of the spotting plane, preliminary ranging shots will be greatly reduced in number and may even become unnecessary, and an entirely new conception of the accuracy of long-range artillery fire will be established. A camera records, by oblique photographs, the splash of every shot in the practices, and these pictures will serve as a basis for study towards the elimination of error.

**Texas Aerial Maneuvers**

NIGHT FLYING, blind flying, day bombing, machine gunnery and aerial photography will be among the special subjects added to the usual military air maneuvers at Hensley Field, Dallas, Tex., during the training period this summer. Floodlights, an illuminated wind cone, obstruction and boundary lights are being installed to insure the safety of night flying.

**Boeing Making Army Bombers**

ANOTHER new Boeing twin-Hornet bomber will be completed this month and delivered to the Army Air Corps, according to the Boeing Airplane Co. of Seattle. Five of the low-wing, all-metal bombing monoplanes are being constructed in the Seattle airplane plant on a service contract with the Air Corps, and the first of these will be test-flown during the first part of this month.



Army Air Corps photo

Twin Pratt & Whitney Hornet-powered Boeing bomber

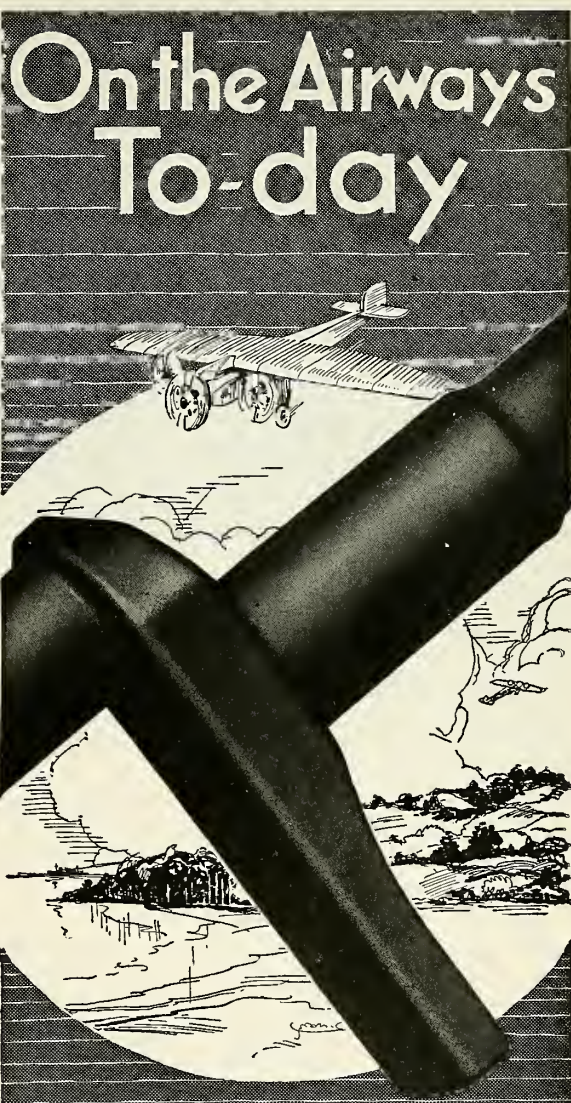


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# Travel by air

**P**ERHAPS your vacation this summer will be one of those Friday-to-Monday week-end affairs. Or maybe you are lucky, and will get away from the city for two weeks—or even a month. Whichever it is, it will seem too short . . . too short in which to do all the things you want to do. ¶ This year, instead of spending needless, annoying hours virtually crawling to your favorite vacation haunt, *fly* there and back. Travel “upstairs,” where it’s clean and comfortable, at a hundred or more miles an hour. Spend the time you have saved by flying, enjoying yourself. ¶ Go modern. Take a tip from the air-traveling business man to whom time means money. See the country as you cannot see it on the ground. Travel by air. ¶ Another thing—it won’t cost you any more, because airline rates have been reduced to the point where today you can go anywhere by air for about the same cost as rail plus Pullman fare. ¶ With the cooperation of *Postal Telegraph*, **AERO DIGEST** will assist you with any information you wish concerning air travel. Write The Travel Bureau, **AERO DIGEST**, 220 West 42nd Street, New York City, for complete data concerning the following:

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# AERONAUTICAL INDUSTRY

## Announce Cord Cup Derby

A NEW type of transcontinental airplane derby for the Cord Cup, cash prizes and two automobiles will be an outstanding long-distance event in connection with the 1932 National Air Races, which are to be held at the Cleveland Municipal Airport, Aug. 27 to Sept. 5, it has been announced by Clifford W. Henderson, managing director of the races. This contest will permit the development of the largest mass flight aviation has produced and will be unique, because it offers equitable competition to any Department of Commerce licensed airplane in the country.

Competitors will be divided into two sections, the Atlantic and the Pacific divisions. Entries in the Atlantic division will take off at an Atlantic seaboard city Sunday, Aug. 21, heading for a mid-continental point, probably at or near Dallas, Texas. At the same time the Pacific division will take off from a West Coast city, heading for the same place. At the central point the divisions will merge and will continue the race to Cleveland, to arrive there Saturday, Aug. 27.

It is estimated that the total value of the prizes, including the Cord Cup, the two automobiles, the leading and consolation prizes, with lap awards at the control stops, will approximate \$20,000, the largest value ever offered in an American air race.

The Cord Cup race will be known as the transcontinental sweepstakes handicap air derby and will be open to both men and women pilots. Entrants will be required to be at the take-off cities several days before the race starts, so that officials may establish their handicaps. All the cities that are to be control stops have not been named, but the routes will be determined by Mr. Henderson. The last control stop will be near Cleveland, so that the competing pilots may finish at Cleveland at frequent intervals.

First place will go to the winner of the most laps en route. He also will obtain permanent possession of the Cord Cup, a custom-built, twelve-cylinder Auburn speedster and a substantial cash award. These will be in addition to the prizes accumulated at control cities for winning various laps. Then will follow four cash prizes in each division. The second automobile award, an Auburn Straight Eight, will go to the leader of the division not represented by the winner of first prize. Twenty consolation prizes of \$100 each will be awarded in each division, making a total of forty-nine cash prizes.

To determine handicaps, all contesting

aircraft will be test-flown over a measured course by three neutral pilots, in two wind directions, and the established top speed will be the average of these flights. The speed handicap will be reduced to a time handicap of minutes and seconds, and the handicap will be absorbed when the contestants are flagged off at the starting city and at subsequent control cities. By this process the first ship to cross the finish line at each control will be the winner of that lap.

## United Aircraft Shows Profit

A NET PROFIT of \$441,445, after all charges, was reported by United Aircraft and Transport Corp. for the first quarter of 1932. The balance was equal, after six per cent preferred dividend requirements, to twelve cents a share on the common stock.

Donald L. Brown, head of the Pratt &

Whitney Aircraft Co., and Eugene E. Wilson, president of the Chance Vought Corp., were elected directors at the annual meeting. Mr. Brown was also elected vice president.

## Texas Fair Air Committee Chosen

HUGO W. SCHOELLKOPF, vice president of the State Fair of Texas, has been made chairman of the fair's aviation committee, which includes regional aviation executives, Chamber of Commerce and State Fair officials and representatives of Southwestern cities. The fair will be held October 8-23, inclusive, at Dallas.

One of the principal features of the fair will be a Southwestern Aviation Exhibit, which will include a model airplane contest, aeronautical moving pictures and an exposition of various types of aircraft.

## COMING AERONAUTICAL EVENTS

June 3-5. First Anniversary Celebration of Birmingham, Ala., Municipal Airport by Birmingham Aero Club.

June 4-5. Air Show at Albany, N. Y., Airport in connection with the Dedication of Albany Seaport.

June 6-8. Sixth Aeronautic Meeting, Aeronautic Division, American Society of Mechanical Engineers, at Buffalo, New York.

June 9-10. Pacific Coast Aeronautic Meeting, American Society of Mechanical Engineers, at the University of California, Berkeley.

June 11-12. Dedication of Elk City, Okla., Airport.

June 20-24. Thirty-fifth Annual Meeting of American Society for Testing Materials at Atlantic City, New Jersey.

June 24. Opening of Aviation Country Club, Lake Champlain, Westport, New York.

June 26-27. Dedication Exercises and Conference on Lighter-than-Air Craft at the Daniel Guggenheim Airship Institute, Akron, Ohio.

July 8-11. Annual Invitation Seaplane Cruise of Aviation Country Clubs.

Week of July 10. Michigan Air Tour, under the sponsorship of the American Legion.

July 11-24. National Gliding and Soaring Contests under the auspices of The Soaring Society of America, Inc., at Elmira, New York.

(Advanced from tentative dates of

July 18-31.)

July 17-31. Annual Motorless Airplane Contests on the Wasserkuppe, Germany.

August 19-21. Fourth Annual Canadian Air Pageant at Dominion Government Air Harbour, St. Hubert, Quebec, under the auspices of the Montreal Light Aeroplane Club, Inc.

August 21-27. International Reliability Tour for 1932, passing through Germany, Czechoslovakia, Austria, Italy, France and the Netherlands, under the auspices of the German Flying Club.

August 21-27. Transcontinental Derby for Cord Cup, finishing at the National Air Races.

August 27-September 5. Eleventh Annual National Air Races at Cleveland, Ohio.

September 6. Aviation Day, marking Opening of Travel Pageant, Atlantic City, New Jersey.

September 22. Opening of Fifth International Aviation Exhibition at Prague, Czechoslovakia.

September 25. Gordon Bennett Trophy Balloon Races at Basel, Switzerland.

October 8-23. Texas State Fair, including Southwestern Aviation Exhibit and Aeronautical Events, at Dallas.

November 18-December 4. Thirteenth International Aeronautical Exhibition, under the auspices of the Syndical Chamber of Aeronautical Industries, in the Grand Palais, Paris, France. (Advanced from November 25-December 11.)

# DIGEST OF RECENT EVENTS

*A Brief Chronological Summary of the Month's Important Aeronautical News*

## **French Complete Long Flight**

MUNCH, Dévé and de Verneilh finished a flight of 13,360 miles from Istres, France, to Noumea, New Caledonia, in a Couzinet Type 33 trimotor monoplane. (April.)

## **Sets a Commercial Record**

LIEUT.-COL. WILLIAM D. TIP-TON, flying at an average speed of 186 miles per hour, set what is believed to be a speed record for commercial planes between New York and Baltimore. (April.)

## **Make Record Flight in China**

PERRY HUTTON, pilot, and James Elder, co-pilot, accompanied by two mechanics, arrived in Peiping, China, after the first direct flight between Hongkong and Peiping. The flight, which was made with one stop for refueling, broke the record for distance in a single flight in China. The plane, a trimotor, all-metal Ford monoplane, is owned by Marshal Chang Hsiaoliang, ousted governor of Manchuria. (April.)

## **Yancey Claims New Altitude Mark**

CAPT. LEWIS YANCEY claimed an unofficial altitude record in an autogiro, when he climbed to 19,200 feet above United Airport, Burbank, California. The flight was made in the Pitcairn autogiro in which he traveled recently over Mexico, South America and Bermuda. (April.)

## **Sets England-Australia Record**

C. W. A. SCOTT, British aviator, flying a de Havilland Gipsy-Moth, arrived in Australia from England, having covered the distance of 10,200 miles in eight days, twenty hours and fifty-four minutes. (April.)

## **Completes Flight to Haiti**

SAID to be the only native Haitian airplane pilot, Leon D. Paris finished a flight from New York to Haiti. (April.)

## **Governors Make Transcontinental Flight**

GOVERNOR JAMES ROLPH, JR., of California and Governor Fred B. Balzar of Nevada completed a twenty-three-hour transcontinental flight from Washington, D. C., to Los Angeles, California. (May 1.)

## **Sets Montreal-Cuba Speed Record**

LOU REICHERS arrived at Newark Airport from Havana, Cuba, on the return trip of a flight in which he set a

record of nine hours, three minutes, for a non-stop hop of 1,786 miles from Montreal to Havana four days previously. The plane was a Lockheed Altair monoplane. (May 2.)

## **Radio Broadcasting Test Successful**

AN eighteen-passenger Curtiss Condor plane of Eastern Air Transport carried a miniature radio sending station in a successful broadcasting trial above New York City. Two toy pianos, played in the airplane, were a feature of the program, which was broadcast over WABC. (May 2.)

## **"Akron" Tests Flight of Small Planes**

THE *Akron* for the first time discharged her own planes from within her frame and returned them to their original places. Fifteen take-offs and hook-ons were completed while the ship was flying at over fifty miles an hour above Lakehurst, New Jersey. (May 3.)

## **"Graf Zeppelin" Makes Speed Record**

ON its return trip from its fourth flight this year to South America, the *Graf Zeppelin* established a speed record of 77½ hours, or an average of eighty-five miles per hour, over a 6,580-mile route. (May 10.)

## **"Akron" Ends Long Flight**

THE Naval dirigible *Akron* was moored at Sunnysvale, Calif., after the completion of a transcontinental journey, begun May 8 at Lakehurst, New Jersey. (May 13.)

## **Reichers in Trans-Atlantic Attempt**

BROUGHT down only forty-seven miles from Ireland, Lou Reichers of Arlington, N. J., who was attempting a trans-Atlantic flight to Paris, was res-

cued by the ocean liner, *President Roosevelt*. (May 13.)

## **First All-Blind Solo Hop**

THE Army Air Corps reported the world's first solo flight using blind flying from start to finish. The flight was made by Capt. Albert F. Hegenberger at Patterson Field, Dayton, Ohio. (May 18.)

## **Fifth Anniversary of Lindbergh Flight**

A RE-ENACTMENT of the take-off of the *Spirit of St. Louis* marked the observance of the fifth anniversary of Lindbergh's flight from Roosevelt Field, Long Island, N. Y., to Paris, France. (May 20.)

## **Report 466-Mile Speed Record**

UNOFFICIAL reports stated that Lieutenant Neri, Italian army pilot, had attained a speed of 466.25 miles an hour in trials on Lake Garda, Italy. (May 20.)

## **Ends Solo Trans-Atlantic Flight**

MRS. AMELIA EARHART PUTNAM became the first woman to fly solo across the Atlantic, landing at Culmore, near Londonderry, Ireland, after a non-stop flight of 2,026.5 miles from Harbor Grace, Canada. Her time was fifteen hours and forty minutes, making an average flying speed of 129.3 miles per hour. Mrs. Putnam made the flight in a Lockheed Vega, powered with a Pratt & Whitney 500-horsepower Wasp engine. (May 21.)

## **Do-X Returns Home**

FOLLOWING a one-stop flight across the Atlantic, the Do-X arrived in Germany. The transoceanic flight was made in sixteen hours and fifty-five minutes on May 21 from Holyrood, Canada, to the Azores, a distance of 1,360 miles. The second part of the flight, to Vigo, Spain, a distance of 950 miles, was flown in twelve hours on May 22. After refueling, the journey was continued to Germany, with a stop at Southampton, England. (May 24.)



Lockheed monoplane flown to Ireland by Amelia Earhart Putnam

### *Curtiss-Wright Corp. Gains*

AN increase in net earnings for the first quarter of 1932 over the net earnings for the corresponding period of 1931 were reported recently by Curtiss-Wright Corp. The company showed a net income of \$302,013, equal to twenty-six cents a share on 1,141,214 shares of \$2 non-cumulative Class A stock. Last year a net loss of \$1,088,124 was reported for the quarter.

The Curtiss Aeroplane and Motor Co., a subsidiary, reported a net income of \$96,700 after all charges for the quarter, as compared with a net loss of \$46,515 for last year.

Another subsidiary, the Wright Aeronautical Corp., showed a net income of \$334,724 for the quarter. A net loss of \$356,859 was reported for the corresponding period last year.

### *Country Clubs Plan Cruise*

THE 1932 annual Aviation Country Clubs invitation seaplane cruise will be held July 8-11, it was decided recently. The following schedule for the cruise was tentatively approved: July 8, from Oyster Bay, L. I., to some point on the eastern end of Long Island for lunch, to Newport, R. I., for dinner and the night; July 9, to Cape Cod or the Boston area for lunch, to Lake Winnepesaukee or Lake Sunapee for dinner and the night; July 10, to the Aviation Country Club of Champlain at Westport, N. Y., for lunch, dinner and the night, with the possibility of an optional side trip to the Adirondack Lake district; July 11, to New York via Lake George and the Hudson River valley.

Charles L. Lawrance and George B. Post were re-elected commodore and fleet captain, respectively, and a regatta committee was appointed, which included them and Richard F. Hoyt, chairman; John W. Gillies and Rudolph R. Loening.

### *Joyce Heads B/J Corporation*

TEMPLE N. JOYCE, vice-president and general manager of the B/J Aircraft Corp. of Baltimore, Md., has been elected president of the corporation, succeeding Thomas A. Morgan, president of the North American Aviation Corp., holding company of the B/J company. At the same meeting Russell McGee, vice-president of the North American Aviation Corp., was elected first vice-president of the B/J Corp. Other officers chosen were Robert Simons, vice president and general manager, succeeding to the post formerly held by Mr. Joyce, and A. P. Boblett, secretary and treasurer.

Mr. Joyce was one of the organizers of the original Berliner-Joyce Aircraft Corp., which became the B/J Aircraft Corp. when it was acquired by the North American Aviation Corp. Mr. Joyce was vice president and general manager of the original corporation and held the same offices and positions under the control

of the company by North American.

The B/J Corp. is now working on contracts calling for military planes valued at nearly \$1,000,000.

### *Walter Beech Organizes Company*

CONSTRUCTION on two models has been started by the Beech Aircraft Co. of Wichita, Kans., founded by Walter Beech, whose resignation from the vice-presidency of the Curtiss-Wright Corp. recently was announced. Both planes are four-place models, with useful loads of 1815 pounds each. One has a cruising range of 1,000 miles with a top speed of 200 miles per hour, while the other has a cruising range of 750 miles with a top speed of 230 miles per hour. Work is being carried on at the Wichita Cessna factory, which the company has rented. Present plans call for the completion of the first plane in September.

Associated with Mr. Beech in the new organization are T. Wells, chief engineer, K. K. Shaul, auditor, and O. A. Mellor-Beech, secretary, all of whom were formerly connected with him in the Travel Air and Curtiss-Wright companies.

### *To Award First Air Mail Medal*

PRESIDENT HOOVER will present the first Air Mail Flyer's Medal of Honor of the Post Office Department to Mal B. Freeburg, pilot of the Northwest Airways, Inc. When Freeburg was piloting a trimotor Ford on its eastbound trip to Chicago from the Twin Cities, the starboard prop broke while the plane was in the air near Wabasha, Minnesota. He maneuvered the machine until the quickly loosening engine could be dropped near the Mississippi River, then he flew to an emergency field about twenty-five miles distant. The rest of the flight was made in a relief plane that had been ordered by radio.

While flying the night mail on the Chicago-Twin Cities division nearly two years ago, Freeburg discovered a Chicago, Burlington and Quincy Railroad bridge on fire. His territory was retraced until he reached a train which he had just passed, circled it several times, flashed his lights and dropped flares to attract the attention of the engineer. He then traveled towards the bridge, circled it a number of times and flew on to his destination.

The medal was authorized under an Act of Congress approved Feb. 14, 1931. It is to be presented to any person who has served as an air mail pilot and has distinguished himself in such service.

### *Norma-Hoffmann Sales Manager*

H. J. RITTER, assistant secretary of Norma-Hoffmann Bearings Corp., Stamford, Conn., has been made sales manager of the organization. He was sales engineer of the firm for several years and later was manager of the New York sales office.

### *Aeronautical Courses for Teachers*

SUMMER sessions at the Boeing School of Aeronautics, Oakland, Calif., will open July 5, featuring special training in aeronautics for public school teachers. The courses are designed to exceed Department of Commerce requirements for transport, limited commercial and private pilot licenses, and airplane and engine mechanic courses will be offered during a six weeks' session.

As a result of conferences with officers of teacher-training institutions, special subjects have been formulated for the training of public school instructors. Certain states give credit for state credentials to teachers in industrial arts and vocational arts taking courses at the Boeing School. Courses in navigation, meteorology and communications will be offered for pilots.

### *Litchfield To Receive Medal*

AWARD of the Spirit of St. Louis Medal of the American Society of Mechanical Engineers will be made to P. W. Litchfield, president of the Goodyear Tire & Rubber Co., builders of the Naval dirigibles, *Akron* and *Macon*, at the sixth national meeting of the aeronautical division of the society at Buffalo, June 7. The medal was founded by the St. Louis section of the Society, and only one previous award has been made, to Daniel Guggenheim, in 1929.

Mr. Litchfield is to receive the medal, it is stated, in recognition "of meritorious service in the advancement of airship construction and design in America." The committee which decided the award consists of Dr. W. F. Durand, Orville Wright, William B. Mayo, P. deC. Ball, Maj. James H. Doolittle and Admiral H. I. Cone.

The award of the medal will be the feature event of the final dinner of the convention, following a two-day discussion by the society of various technical problems in airships and airplanes.

### *Oklahoma Good Will Tour*

NINETEEN key cities in Oklahoma were visited last month on a goodwill industrial air tour. The tour was made under the auspices of the Junior and Senior Chambers of Commerce of Claremore, working in cooperation with the Oklahoma Military Academy of that city and the Spartan School of Aeronautics at Tulsa, which has an affiliation with the military school.

A total of 1,000 air miles was flown. Twenty-seven persons in nine planes took part in the tour. An unusual feature was the fact that all of the planes were Oklahoma products, eight of them being Spartans, manufactured by the Spartan Aircraft Co. of Tulsa, and one a Cavalier, made by the Star Aircraft Co., Bartlesville.

### **Parks Scholarships Contest**

AS a means of encouraging a greater interest in aviation, Parks Air College, East St. Louis, Ill., is offering through the St. Louis Chamber of Commerce Air Board twenty resident scholarships in aviation to high school students. The first ten awards, representing ten complete courses, will be given to candidates living within a radius of 100 miles of St. Louis. The balance of the scholarships will go to students living outside that area. Students graduating from high school this year or who have graduated within the past two years will be eligible.

The period from May 16 to June 6 has been fixed for the essay competition, the winners of which will qualify for the scholarships. The basis of the awards will be 200-word essays written by the students on one of the two subjects, "St. Louis as an Air Center" or "The Development of Air Transportation." Students entering the competition are required to file with their essay a brief outline showing their interest in aviation. Candidates competing for the first ten scholarships will be required to inspect the Municipal Airport of St. Louis, Curtiss-Steinberg Airport at East St. Louis and Parks Air College, after which he will be given an "Airport Inspection Certificate." This, along with the questionnaire supplied by the Air Board of the St. Louis Chamber of Commerce, must be affixed to his essay.

The total value of the awards is in excess of \$5,000, according to Oliver L. Parks, president of the college. The awards, which are made annually, consist of ten complete resident training courses of seven and one-half months in the technical school at Parks College, five resident courses of complete training in all subjects pertaining to airplanes and five courses of ten weeks' instruction in engines. In addition, two awards of sixteen additional weeks of post-graduate work in the Master Mechanics School of the College will be offered in competition among the students winning the first ten awards, and one award of twenty additional weeks' instruction will be placed in competition among the students winning the second ten scholarships.

George B. Logan, chairman of the Air Board Committee, is directing the activity. He is assisted by James Troy, secretary of the Air Board. More than thirty leaders in business and professional life represent the jury of awards. Announcement of the winners, who will start their training at Parks Air College June 20, will be made Saturday evening, June 18, over Station KMOX.

### **Parks Takes Over Von Hoffmann School**

PARKS AIR COLLEGE, near East St. Louis, Ill., has purchased the complete prospect mailing list of the Von Hoffmann Air College and has retained

Lieut. H. R. Bouse, former manager of the Von Hoffmann school, as the Parks Lambert Field representative. The Von Hoffmann Aircraft Corp., which is the holding company for the Von Hoffmann Air College, has been sold, and the new operators will not continue the school.

### **Form Aircraft Parts Company**

THE Metal Rib Co. of Bradford, Pa., has been organized to manufacture aircraft structures, such as metal ribs, ailerons, bulkheads, longerons, fairing, trailing edges and various drawn sections.

### **International Balloon Race Rules**

THE Aero Club of Switzerland has announced the special regulations for the 1932 Gordon Bennett International Balloon Race at Basel, Switzerland, September 25, which is to be held under its auspices.

The race will start at 4:00 p. m., inflation of the balloons beginning at 9:00 a. m. Entries must be received by the club by July 1, and the fee with the name of the balloon and pilot, by August 1. The capacity of each balloon is limited to 77,690.8 cubic feet, with a tolerance of five per cent.

Eight prizes amounting to over \$2,500 will be awarded the contestants in addition to the James Gordon Bennett trophy given by the Detroit Board of Commerce. Each pilot and aide will be presented with a commemorative medal.

Members of the American team will include Ward T. Van Orman and Alan L. MacCracken, winners of last year's race; Lieutenants T. G. W. Settle and Wilfred Bushnell of the Navy, who took first place in the 1931 National Balloon Race, and the pilots and aides awarded the first two places in the 1932 National Balloon Race at Omaha.

### **Texas Air Body Organized**

TENTATIVE organization of the Texas aviation conference was effected in San Antonio, Tex., recently. The conference will act as a permanent clearing house through which aeronautical committees in cities over Texas may unify their efforts to forward aviation development. Roland A. Laird, aviation secretary of the Houston Chamber of Commerce, was named chairman and authorized to appoint a committee which shall submit details at another meeting in Houston within ninety days.

The conference, calling for enforcement of a state aviation code, decided to ask the Legislature to provide funds for a flying state ranger to aid such enforcement. Urging expansion of the emergency flying field system, the conference asked the State Highway Department to include on its maps both regular airports and emergency fields. Further marking of air routes also was advocated.

### **Autogiro Inventor Awarded Medal**

JUAN DE LA CIERVA has been awarded the Daniel Guggenheim gold medal of 1932 for development of the theory and practice of the autogiro. This award was made by a board having eight members in the United States of America and seven foreign members, all men of high standing in the engineering and scientific activities of aeronautics. The seven foreign countries represented are Canada, England, France, Germany, Holland, Italy and Japan.

The Daniel Guggenheim medal was established in 1928 by The Daniel Guggenheim Fund for the Promotion of Aeronautics. It is under the joint sponsorship of The American Society of Mechanical Engineers and the Society of Automotive Engineers, each of whom appoint four members of the Board of Awards. The president of the 1931-32 board, which awarded the medal to Mr. Cierva, was Admiral H. I. Cone, Commissioner of the United States Shipping Board. At the recent annual meeting, Capt. Emory S. Land, U. S. N., was elected president for 1932-33, and Maj. E. E. Aldrin, vice-president.

Medals have been awarded previously to Orville Wright of the United States, Ludwig Prandtl of Germany and Frederick William Lanchester of England.

### **Demonstrates Autogiro in Northwest**

THE first autogiro to be owned in the Northwest has been purchased by Maj. Leslie G. Mulzer, owner and operator of the Mulzer Flying Service at Wold-Chamberlain Airport, Minneapolis, Minn., and the Nepco Tri-City Airport at Wisconsin Rapids, Wisconsin. The autogiro is one of the latest Pittcairn PCA-2 three-place, open-cockpit models, with a Wright Whirlwind E type J-6 300-horsepower engine. The autogiro will be stationed at Wold-Chamberlain for the next few months for the purpose of carrying passengers and demonstrating the flying characteristics of the autogiro.

### **Country Club Holds Meet**

CROCKER SNOW won two out of seven events in the annual spring air meet of the Aviation Country Club, Hicksville, L. I., N. Y., May 15. In addition to taking first place in a barrier landing contest, Mr. Snow won a thirty-mile race for planes developing 125 horsepower. Other contest winners included James B. Taylor, Miss Mary Gawthrop, Luis de Slorez, Miles H. Vernon and Mr. and Mrs. Eugene Detmer.

### **Select Mamer Traffic Manager**

R. S. MAMER, general manager of the Air Transport Terminal Corp., has been appointed western traffic manager for Mamer Air Transport, with offices at Boeing Field. The Mamer company is now operating trimotor Fords from Seattle to Spokane daily.

### Report 1932 Airplane Manufactures

AIRPLANES manufactured in the United States during the first three months of 1932 totaled 376, according to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics. These aircraft included 134 manufactured for domestic civil use, 219 for military deliveries and twenty-three for export to foreign countries.

The 134 craft manufactured for domestic civil use were the products of fifty-two companies or individuals. Of these, three manufactured more than ten ships each, these companies producing approximately twenty-six per cent of the total planes for domestic civil use. Eight companies built between five and nine planes each; eight companies made two or three each and thirty-three companies or individuals manufactured one each.

Aircraft built for domestic civil use included 101 monoplanes, nineteen biplanes and fourteen autogiros. The detailed classifications were as follows: Open-cockpit monoplanes, sixty-three; cabin monoplanes, thirty-four; amphibians, one; seaplanes, three; open cockpit biplanes, fourteen; cabin biplanes, five; autogiros, fourteen.

The report is based on a record of Department of Commerce licenses, identification marks issued for unlicensed airplanes and reports as of May 1 for aircraft manufactured between January 1 and March 31.

### Corben Company Moves

THE Corben Sport Plane Co., formerly of Peru, Ind., has moved its entire factory and offices to Madison, Wis., where they will continue to manufacture the Corben Baby Ace single-place sport plane and the new Corben Junior Ace two-place plane. Both of these will be offered in semi-built kits and flyaway. The company plans to enter into the rebuilding and repairing of aircraft and engines.

In addition to the manufacturing, the company has taken over the Madison Airport and equipment which consists of four commercial planes. A complete flying service will be carried on as in the past. L. F. Schoelkopf is president of the new organization, and O. G. Corben will act as vice-president and general manager.

Tests have been completed on a Corben Junior Ace, powered with a Continental A-40 engine.

### Decide Winners of Ohio Contest

THE Post-Gatty 'round-the-world flight was the greatest feat in aviation in 1931, according to the majority of northern Ohio high school students who participated in the essay contest conducted by the Cleveland Institute of Aviation. The contest gave a choice of two subjects, "The Outstanding Development in Aviation in 1931" and "The Outstanding Feat in Flying in 1931."

Prizes to the extent of \$1,105 were given in the form of aeronautical instruction at the institute. The ten winners and their subjects were: Gordon Reublin of Ashtabula, "The Post-Gatty Flight"; Frank Cavenagh of Hudson, "The Diesel Aviation Engine"; Milton H. Campbell of Painesville, "The Completion of the Akron"; Ray Young of Berea, "Jimmie Doolittle's Flight in the 1931 Air Races"; George Revay of Akron, "Blind Flying"; Wendell A. Scott of Uniontown, "The Post-Gatty Flight"; John E. Martin of Akron, "The Post-Gatty Flight"; V. Orsarg of Youngstown, "The Autogiro"; Calvin Rennecker of Norwalk, "The Army Air Corps Manuevers in May"; and Martin H. Eisenmann of Garrettsville, "The Development of Light Airplanes."

### Pitcairn Appoints Dealers

PITCAIRN AIRCRAFT, INC. of Willow Grove, Pa., has announced the appointment of Pal-Waukee Airport, Inc., of Chicago, Ill., as its dealers for central and northern Illinois. The Pacific Giro Sales Co. and Santa Barbara Airports, Ltd., of Santa Barbara, Calif., are now Pitcairn dealers for California, Washington and Oregon.

### Denver Postal Men Make Air Map

AN animated air mail map has been completed by postal employees of the Denver, Colo., post office. The purpose of the map is to show the speed of air mail and the territory served by the four dispatches from Denver. The speed of air mail is shown by the progressive illumination of 114 electric bulbs along the airlines, the four dispatches being indicated with red, yellow, blue and green lights.

### Fairchild Extends Service

FAIRCHILD AVIATION CORP. have completed arrangements with American Airplane and Engine Corp., whereby all materials, parts and equipment pertaining to the Fairchild 71, KR-21 and KR-34 planes will be transferred to them. Parts and service facilities in the future will be handled by Kreider-Reisner Aircraft Co., Inc., Hagerstown, Md., which is the airplane manufacturing subsidiary of Fairchild Aviation Corp.

### May Choose Champion Pilot

CLIFFORD W. HENDERSON, managing director of the National Air Races, has proposed a system of points to be given place-winners in the 1932 National Air Races, the contestant receiving the greatest number of points to be called American Champion Air Race Pilot. Mr. Henderson hopes that such a system, which is being considered for inauguration at Cleveland next summer, can be based after this year upon participation in large meets throughout the United States.

### Hold Alabama Air Conference

A TWO-DAY conference of men in the aeronautical industry in Alabama was held at Montgomery recently. The meeting, under the auspices of the Alabama Aviation Commission, was called by Amzi Barber, state commissioner of aviation. Those attending the meeting included pilots, owners and mechanics.

The conference consisted principally of round-table discussions of aviation conditions in Alabama. Promotion of additional airports and more and better air markers were among the matters discussed.

### Ryan Sells More Planes

THE T. C. Ryan Aeronautical Company announces the sale of two more new Great Lakes planes at their San Diego, Calif., office. This makes a total of twenty-five planes of this type which the Ryan company has sold since its appointment as Southern California distributors for the Great Lakes Aircraft Corp.

### Blimp to Have Chicago Dock

GOODYEAR-ZEPPELIN CORP. has awarded a contract for a new blimp dock to be built near Chicago. This dock will be used to house the airship *Columbia*, which will be employed by Goodyear for observation flights over the World's Fair Grounds at the lake front and for aerial tours over Greater Chicago.

Construction was awarded to the Austin Co., Cleveland, with completion date set for August 1. The structure is 70 feet wide, 160 feet long and 70 feet high and designed for future expansion. One hundred thirty tons of structural steel will be required. The steel framework will be covered with corrugated copper bearing steel. Two large hinged doors are to be located at one end. Wilbur Watson and Associates of Cleveland are consulting engineers.

The site is a twelve-acre plot adjoining the Pal-Waukee Airport at Wheeling, Ill., which is located between Evans-ton and Waukegan.

### Handle Switlik Sales

J. N. HARMAN, president of National Aviation Products, Inc., recently announced that his company has secured the exclusive selling agency in the United States for Switlik Parachutes. Offices of the National Aviation Products are located at Central Airport, Camden, N. J.

### Elect Aviation Corp. Directors

E. L. CORD, L. B. Manning and R. A. Lovett were elected directors of the Aviation Corp. at a recent stockholders' meeting. Nineteen directors were re-elected. At a special meeting following the annual meeting the company's authorized 5,000,000 shares of stock were changed from no par value to \$5 par value.



## TRADE LITERATURE

### *New Pamphlets and Books of interest to the Aeronautical Industry*

#### *Welding Rods and Electrodes*

A CATALOG on RegOroD electrodes and welding rods has been published by The Bastian-Blessing Co. of Chicago. The booklet describes each type of rod and gives information in reference to the use of the rods in specific applications. It also contains tables for the use of the welder and welding engineer, including data on deposited metal for a given thickness of plate, approximate rod sizes for gas-welding various thicknesses of metal, variations of pressure in standard oxygen cylinders at various temperatures, chemical and physical properties of gases under standard conditions, flame temperatures, properties of metals and U. S. Standard gauge for sheet and plate.

#### *Screws and Nails Booklet*

INFORMATION and technical data relating to the use and application of screws and nails manufactured by Parker-Kalon Corp., 200 Varick Street, New York City, is given in a thirty-page pamphlet published by the company. Used for making fastenings to sheet metal, steel, cast iron, die castings, brass, bakelite, slate, ebony, asbestos and masonry and for fastening sheet metal to wood, the screws and nails are classified according to types, and full directions are set forth for their use. A particularly useful page is headed "Helpful Hints," which contains warnings against common mistakes in application of the appliances.

#### *Handbook for Aviators*

A RADIO CHART including information regarding every radio broadcast of any character which a pilot may receive over all the organized airways in the United States constitutes an important part of the 1932 Stanavo Pilot's Handbook. Published by Stanavo Specification Board, Inc., an organization of the Standard Oil companies of California, Indiana and New Jersey, the booklet also includes a radio map showing the exact orientation of all operating radio beacons of airways in the United States. Other features include a chart of fuel recommendations, data on airports and airways, air traffic rules and general aeronautical information. One of the innovations in this year's handbook is a small course protractor, which is placed in a pocket inside the rear cover of the book.

#### *Steel Alloy Booklet*

A PAMPHLET recently published by Associated Alloy Steel Co. of Cleveland,

Ohio, described the new stainless steel alloy, Nevastain RA. The booklet contains directions for various fabrication processes and analyzes the metal, also giving its properties. Several illustrations show the alloy in various uses, from cooking equipment to elevator enclosures.

#### *"Zeiss-Dywidag" Booklet*

THE merits of "Zeiss-Dywidag" construction of large buildings are discussed in Bulletin No. 138 published by Roberts and Schaefer Company, Wrigley Build-

ing, Chicago, Ill. The firm has the exclusive American rights for the designing and building of permanent reinforced concrete buildings according to the "Zeiss-Dywidag" system, incorporating "Shell Domes" and "Barrel Shell Roofs." Detailed information regarding the system is supplemented by profuse illustrations, including photographs and drawings. Of special interest are a picture and several sketches of modern airplane hangars, with suggestions in design for this type of construction.

## NEW AERONAUTICAL BOOKS

### AIRPLANE PILOT'S MANUAL

By ROSS MAHACHEK

COMPILED for the purpose of assisting but not replacing the flight instructor, "Airplane Pilot's Manual" is of interest both to the prospective private pilot and to the flier who wishes to become a professional pilot.

The book is divided into three parts. The first section discusses recent developments in civil aviation and the qualifications desirable in a pilot. The second explains principles of airplane construction and operation and gives the elementary knowledge needed for flight training, leading up to qualification for a private pilot's license. In the third part the author describes methods of performing advanced maneuvers and extended flights and of safely contending with adverse flying conditions. This section, which is intended to assist the private pilot in preparing to qualify for a commercial pilot's license, also includes a discussion of the operation of unfamiliar types of airplanes and relates means of avoiding accidents.

As a former chief instructor at several flying schools and present flight officer at the U. S. Naval Reserve Aviation Base, the author has drawn upon his own experience in compiling this book. In addition to many hours of commercial and naval flying, he has spent six years in flight instruction, both commercial and military. Among his accomplishments was the devising of a simple system of practising blind flying, which he describes in a section of the manual.

### A GENERAL TEXT ON AERONAUTICS

By HILTON F. LUSK

WRITTEN by a professor of aeronautics at Sacramento Junior College, this book is designed to serve as a text for a general aeronautics course in technical institutes, junior colleges, technical high schools and aviation ground schools. It is suitable also for private study.

A chapter particularly interesting to the student is entitled "Occupations in

the Aeronautical Industry." It contains a brief analysis of the activities of the industry and lists more than 125 occupations and the recommended educational preparation. Other subjects covered in the book include balloons and airships, principles of flight, construction and operation of airplanes and autogiros and aircraft engines, aeronautical instruments and accessories, aviation and meteorology.

At the end of each chapter is a group of questions among which are some typical of those asked in Department of Commerce examinations for the transport pilot's license. The illustrations, both photographs and drawings, have been selected for their educational value, and much of the elementary nomenclature and terminology of aeronautics is made more understandable through these aids. Except for a few easy formulas, the language of mathematics has been avoided, many of the aeronautical phenomena being based upon physical analogies.

### ZEPPELINS OVER ENGLAND

By VON BUTTLAR BRANDENFELS

EXCITING memories of the World War are revived in this translation of a book by a young German naval officer. Dealing principally with the author's personal experiences as commander of a Zeppelin, it is packed with thrilling adventures and stirring exploits.

The book gives first-hand accounts of life at the airship bases and on board the Zeppelins; it describes physical and moral dangers encountered, accident, responsibility, raids, routine and battle. "A Terrifying Start," "Six Hundred Bullets Hit Our Airship," and "A Journey through Hell" are a few headings of chapters whose promise of excitement is fully carried out in their contents.

The lighter side, however, is not neglected. In the "Violet Club" incident and the "sailing" of a Zeppelin on the waters of the Alster in order to win a bet are found two examples of many humorous accounts. The author himself adds not a little to the entertainment value of the book by his vivid, conversational style.

# FOREIGN NEWS IN BRIEF

Compiled from correspondents' reports and the Aeronautics Trade Division, Bureau of Foreign and Domestic Commerce.

## England-Australia Light Plane Speed Record

FLYING in a small, light airplane, Charles W. A. Scott covered the 10,200 miles between England and Port Darwin, Australia, in eight days, twenty hours and fifty-four minutes, finishing the flight April 28 and establishing a new speed record for the course. He flew first from England to Brindisi, Italy. The next day he proceeded to Aleppo and flew through the night over the desert. He crossed the sub-continent of India from west to east in one day and then flew to the Dutch East Indies, finishing with a journey across 500 miles of sea from the island of Timor to the Australian mainland. In little more than a week he traveled half-way around the world, from the northern temperate zone to the tropics south of the equator.

Scott's airplane was the same de Havilland Gypsy-Moth in which he flew last year from Australia to England, setting a record which later was broken by J. A. Mollison. His latest flight was undertaken in an effort to regain the record from England to Australia, wrested from him towards the end of last year by C. A. Butler, who covered the distance in a hundred minutes less than Scott had done a few months previously. Though his machine is considerably slower than Butler's, Scott worked out a schedule to win back the record by flying to Port Darwin in 8½ days. He lost eight hours because of adverse winds over part of Iraq and Persia and again because he chose to rest before attempting the passage of the Timor Sea, but he landed in Australia soon enough to lop over five hours from the old record.

The plane is a standard machine converted to use as a long-range single-seater. Its fuel capacity is 101 gallons, sufficient to maintain flight for about seventeen hours.

## AUSTRALIA

J. McLACHLAN in a Moth won the race for the Viner Air Trophy, a handicapped event conducted by the Aero Club of New South Wales. The distance is 200 miles, and the race is confined to commercial airplanes.

A WORLD endurance record for a model plane is claimed by W. Docter, when in a competition conducted by the Model Flying Club of Australia, his plane passed out of sight after fourteen minutes, 40 2/5 seconds. Another model

plane record is claimed by A. Robson, of the Model Aircraft Association, who flew his seaplane for four minutes, thirty-seven seconds, when it was lost to sight.

A COMPETITION for fuselage models for the Wright Cup, conducted by the Model Aeroplane Association at Hargrave Park, was won by R. Cramsie with seventeen minutes 7 1/5 seconds, his model afterwards being lost to sight.

THE Sydney-Brisbane air mail is now running four times weekly, sufficient support having been accorded to the airline.

A NEW wireless station at Richmond Aerodrome has been completed and will be able to keep in touch with R. A. A. F. planes all over Australia, in addition to broadcasting warning messages concerning the weather.

## CANADA

A DAILY passenger and express service between Toronto and Detroit was inaugurated May 16 by Canadian Airways, Eastern Lines. Stops are made at three cities en route, and connections are made at Detroit for Chicago, Winnipeg and other western points.

DE HAVILLAND AIRCRAFT of Canada have constructed another D. H. 61 seaplane, powered with a geared Hornet engine, for the Ontario Provincial Air Service. The new five-place Fox-Moth, powered with a Gypsy III engine, will be in production about July 1. The de Havilland company is now service representative for Bellanca aircraft in Canada.

J. D. M. GRAY of Toronto is planning a flight from England to Canada by way of Iceland and Greenland early this summer. A Compter Swift, powered with a Pobjoy R engine, similar to that used in recent record-breaking flights to Australia and over the Andes, will be flown.

AIR MAIL service between Montreal and Rimonski, to facilitate the dispatch and arrival of trans-Atlantic mail, has been resumed following its suspension last November.

CANADIAN AIRWAYS, LTD., has inaugurated daily express and passenger service between Calgary and Edmonton. Two eight-passenger Fokker F-14 planes are used on the line.

AIRPORTATION, LIMITED, has been organized in Canada to transport ore, supplies and equipment by air to the radium strike region in the Great Bear Lake territory.

SQUADRON Leader F. C. Higgins of the Ottawa Station, Royal Canadian Air Force, has been appointed head of the customs preventive aircraft section of the Royal Canadian Mounted Police of the Maritime Provinces. He will be stationed at Moncton, N. B., which is headquarters for the maritime division of the R.C.M.P., along with four other pilots from the Ottawa station.

The Mounted Police recently took over the New Brunswick, Nova Scotia and Prince Edward Island provincial forces and the Customs Preventive Service. They will supervise all aerial anti-smuggling activities and also act as coast guards.

## ENGLAND

THE 13th Royal Air Force Display at Hendon June 25 will mark the culmination of squadron training for the year, and flying practices are now taking place for the varied program which will again demonstrate important progress in aeronautics. Nearly 200 aircraft will take part, including some new and novel types.

CONSTRUCTION on the largest wind tunnel in Great Britain has been started at the Royal Aircraft Establishment, Farnborough. Designed and made by Boulton and Paul, aircraft builders, the new tunnel is of steel and reinforced concrete and will be housed in a building 230 feet long, 140 feet wide and ninety feet high. In shape the tunnel will be a tube between 400 and 500 feet long, bent to make a closed circuit.

A gigantic fan, driven by motors developing 2,000 horsepower, will force air through the tunnel. One section of the tube is cut away for a distance of approximately forty-five feet, and the two free ends open into a hermetically sealed chamber. This arrangement produces about the center of the chamber a jet of air, twenty-five feet in diameter, which moves at a velocity of more than 100 miles an hour. Airplanes under test will be placed in the sphere of influence of this jet and subjected to wind forces similar to those encountered in actual flight.

(Continued on following page)

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## AERO DIGEST

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(Continued from preceding page)

IMPERIAL AIRWAYS service from London to Cape Town, South Africa, has been opened to passengers. It has been in use for mails and freight only for several months. The planes leave London every Wednesday morning, taking eleven days to reach Cape Town, the route passing through France, Italy, Greece, Egypt, the Anglo-Egyptian Sudan, Kenya Colony, Tanganyika Territory, Uganda and Northern and Southern Rhodesia. The first of a fleet of eight new four-engined passenger monoplanes are being completed for the airline by Armstrong Whitworth Aircraft, Ltd.

A LIGHTNING bolt struck an Imperial Airways ship last month while it was in flight over Tonbridge. It damaged two of the four propellers, put the radio telephone equipment out of commission and broke several windows in the fuselage. However, no one on board was injured, and the plane returned to Croydon Airdrome safely.

THE eight newest planes of Imperial Airways, officially termed Handley Page type 42, are the largest passenger-carrying land planes in the world. The upper wing span of each is nearly 140 feet, and the fuselage is 86½ feet long.

## FRANCE

THE 1932 French Air Budget for the period of April 1-December 31 has been set at approximately \$71,599,259. Among the more important appropriations is \$6,115,200 for subsidies to commercial companies, including \$2,352,000 for the Aeropostale Company. Research, concentrating on the construction of prototypes, is allowed \$4,496,044. Other principal items include: Salaries of central administration, \$488,383; subsidy for development of aviation in general, \$261,023; encouraging "tourist" and "sanitary" aviation, \$382,200; meteorological office, \$205,800.

The "metropolitan district," which includes commercial aviation items, is allotted \$55,338,595. Other approximate figures are: Algeria and Tunisia, \$4,875,571; Morocco, \$2,500,638; the Orient, \$2,101,702; other colonies, \$2,872,753, and special section—construction and raw material, \$3,920,000.

## GERMANY

THE 1932 motorless airplane contests in the Rhon will be held from July 17 to 31 on the Wasserkuppe. Regular classes in the Wasserkuppe glider school of the Rhon-Rossitten Society and in the Rossitten school on the Kurische Nehrung near Königsberg, East Prussia, have already started.

THE Deutsche Luft Hansa is operating a summer service between Frankfurt and Cologne. Six planes fly in each direction on the line on weekdays and two on Sundays.

THE Dornier-Wal D 1422 will become an exhibit in the Deutsche Museum of Munich. Famous as the flying boat in which Wolfgang von Gronau made his trans-Atlantic flight in 1930, the plane also saw service with Amundsen, when he attempted to reach the North Pole in 1925, and was used two years later by Courtney in a trans-Atlantic flight attempt.

## JAPAN

THE national contribution for military aviation has reached about 3,000,000 yen since the Manchurian conflict. Many airplanes have been constructed and transported to Manchuria and Shanghai. About forty planes will be paid for by the contribution and will be turned over to the Army. Other funds will be spent on anti-aircraft guns, airplane detectors and searchlights for defense purposes.

A DAILY round trip has been inaugurated over the Mukden-Harbin route in Manchuria.

CIRRUS engines have been imported into Japan by the Ishikawajima Aircraft organization at Tachikawa for several years, and experiments in the manufacture were carried on. As a result of these experiments, it was decided recently to make Cirrus engines at the Japanese factory.

## SPAIN

AN appropriation of \$50,000 has been voted by the Spanish Assembly for the establishment of the first Government air mail lines. The service will operate in conjunction with civil and military aviation.

THE Spanish Aeronautic Federation

has been reorganized under the direction of the Ministry of Communications. It will officially represent Spanish air sports in Spain, and it controls all regional aeronautic federations, being authorized to regulate and inspect Spanish air sports. The headquarters of the federation is in Madrid, with the Director General of Civil Aviation in charge.

THE Gibraltar Airways, Ltd., has been formed to operate an airline between Gibraltar, Spain, and Tangier, Morocco. Using amphibions, the trip requires twenty to thirty minutes.

THE liquidation of the Subventioned Air Lines Company has been ordered by the Spanish Cortes, and the Spanish government has taken over the air services maintained by it. The company is to be managed by a committee including government officials and two members appointed by the company directors.

## SWITZERLAND

THE 1932 budget of the Federal Air Office amounts to \$15,765. Of this, \$11,502 is to be used as a subsidy to civil aviation, while the remainder includes \$2,026 for aviation safety service and \$1,582 for administrative expenditures.

CONSISTENT increases in air traffic for 1931 over 1930 are shown in recent reports by all services operating in Switzerland. Although the official flying season is only six months long, Swiss airplanes carried 2,419 passengers and flew 26,694 miles on special and tourist flights last year. Passengers carried on all lines operating in Switzerland totaled 22,366; mail, 509,604 pounds, and freight, 906,356 pounds. The corresponding figures for 1930 were 18,213, 356,368 and 712,587.

THE Basel-Zurich-Munich-Prague service has been changed this year to include Vienna, Budapest, Belgrade and Bucharest, the entire trip to be made in one day. It is planned to have a night mail service between London and Zurich, via Paris and Basel.



Lockheed "Orion," a four-passenger transport used between Zurich and Vienna

## FUTURE SUPER-SPEED FLYING

(Continued from page 78)

initial acceleration to a 3,000-pound airplane. The railway and the elevator engineer would have an interesting time designing such a catapult. It is important in this connection that with very great flying speeds the direction of take-off, whether into the wind or otherwise, becomes comparatively unimportant; the take-off can always be in the same direction, which is a great simplification.

Inventors may also be successful in devising a mechanism for take-off on a circular path, applying the principle of the sling on a large scale. It certainly has merits. By that means more time could be allowed for the start, and the maneuver could be carried out in a more gentle manner than is customary in the straight-away catapult.

Such methods of starting a super-speed airplane are not presented as in any way definitely practical or even coming. Only the future will show the answer. They are presented only to prove that there are many ways that have not really been tried as yet. The possibilities are by no means exhausted, but on the contrary, the surface has scarcely been scratched. Whatever method will be adopted, the crucial point remains the airplane's own method of propulsion. The source of power has to be vastly more reliable than it is today. There must be practical certainty that at the end of its start the airplane will positively sustain itself in flight and quickly climb to a

safe distance from the ground. This is a major reason why flying with super-speed depends upon the invention and production of a higher type of engine than exists today.

In regard to the question of landing, the horizontal velocity must be vastly diminished, and yet the airplane must be kept from dropping like a stone. Here, of course, the airplane is restricted to its own resources; little or no help can be given it from the ground. In other respects, however, the problem is less formidable than that of the start, because landing requires no power; on the contrary, it requires dissipation of power, a problem much simpler than its creation. It might easily be accomplished by some form of air brakes.

The airplane must also be kept from dropping down, and for this purpose some kind of parachute action is necessary; by the word "parachute" we need not think of the silk or fabric type of parachute used by aviators; they would hardly be satisfactory, as a controlled or gradual effect is required. The most promising principle for obtaining parachute action developed so far seems to be some modification of the autogiro principle. Gyroplanes have wing surface enough for flying; they use their rotors for starting and for landing and drag them uselessly through the air during the rest of the time in flight. The future possibility now alluded to is distinctly discernible in today's gyroplanes. Make the rotor less resistive, retract it, shield it, keep it from rotation or do anything to eliminate the rotor drag during flight, for its lift is not needed then. With that accomplished we have made a definite step towards flying with super-speed.



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## WEIGHTY AFFAIRS OF ANTS AND MEN

(Continued from page 22)

Other old airmen with obscure flying businesses were overwhelmed by herds of frantic investing citizens who begged permission to dump hundreds of thousands of dollars into ten-thousand dollar aviation enterprises and really get them going—where, nobody exactly knew. And the following week the dazed airmen found themselves wandering around among flocks of busy workmen who were frantically putting up new factories, new hangars, hauling in new machinery and office furniture and blonde stenographers and getting everything ready to turn out hundreds of airplanes a day to supply the thousands of enthusiastic purchasers who at that very minute were dashing through flying courses at dozens of schools. It was a riot with champagne bottles—all empty now, alas!

We look back on it now and can't find much meaning to any of it. But we're going to look back on today and not find much meaning in it, either. Of course we flew too high then, but now we're just hedge-hopping. We always do that in this country—sit on the top of the world or else crawl under it and try to drag it down on top of us. We're the breed of people who go up in the air to cure deafness and down in a subway to cure dumbness—and then wonder why we don't stay fixed. We feed the Belgians and the Chinese and then complain that we haven't anything to feed ourselves; we lend, which means donate, all our money to foreign governments and crooked Swede manufacturers and then sell charity poppies on street corners to aid our disabled veterans. If you think it's hard to find a meaning in ocean flying, just try to find a meaning in our national financial antics!

The funny part of it is that if general business the world over hadn't taken a nose dive in 1929, every bit of this startling aviation expansion would have been justified. You doubt me? Well, I base that belief on the fact that, despite the slump, air mail and passenger business has forged ahead; furthermore, in the entire world it is the only form of transportation that has made considerable gains in these doleful days; all the others have registered tremendous losses in passengers, freight and express. I don't feel that the aviation industry is merely giving itself a hypodermic injection of synthetic faith when it ponders on that cheering fact and permits itself to feel a justifiable confidence in the future when general business conditions improve. Faith without works is without value; but in this instance I am assured that we really have the works.

After all, while an ocean flight stirs the public's emotions, it also points out some pretty solid gains in technical progress. People begin to realize that if airplanes and engines have been developed to a point where they can carry pilots across oceans with some measure of safety, they ought to be able to carry other people over land with a very satisfactory measure of safety, especially when they are backed up by efficient ground organizations, weather reporting systems, radio directional service and hundreds of safe fields where they may land in emergencies.

But I begin to fall into the common error of searching for meanings in things. I'll leave that to statisticians, economists, financiers and politicians; they may be relied upon to find meanings today that are meaningless tomorrow. This keeps them eternally busy hunting up new meanings

(Continued on following page)

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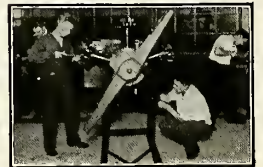
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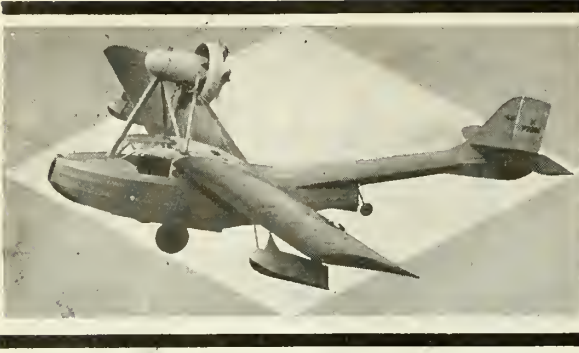
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*(Continued from preceding page)*

and new audiences to take stock in them. I just admit all things are meaningless to me, and rest easy. You'd be surprised the trouble this saves me.

Tell you one thing I'd certainly like to see, though; and it would really mean a lot to me. I'd like to see our Senate and Congress go in for ocean flying on a big, broad scale. I'd like to have our whole political crew—with a few carefully selected exceptions—make a business of flying over ocean after ocean and keep right on traveling. And if any of them drop in, Captain Fried is requested not to heave to and pick them up, either; he's to put on full steam ahead. I honestly believe that it would be an excellent investment for the American taxpayers to donate airplanes, gasoline, oil and absolutely no compasses for such a worthy and helpful endeavor. And if we could induce our big financial men to go along as stowaways, the happiness and prosperity of our country would be assured. If this plan won't end the depression, then nothing will.

### FUTURE SUPER-SPEED FLYING

*(Continued from page 25)*

to one-tenth its previous magnitude. Some new and still unknown method may again reduce it to one-tenth of its present value.

Progress in reducing drag may be accompanied by progress in the art of overcoming drag. As speed increases, the point will eventually be reached where direct-drive and direct-reaction engines (perhaps employing some modification of the rocket principle) may become practical. They will then be more economical, reliable, compact and lighter than our present-day multiple-cylinder internal-combustion engines. The difficulty with the rocket principle is that its combustion products are thrown out with their natural velocity; that is, the velocity that gives rise to a kinetic energy equal to the energy available. As long as this natural velocity is far in excess of the flying speed, the efficiency is naturally low. The power usefully gained is equal to the product of the reaction force and of the flying speed. The power lost is equal to the same force multiplied by the absolute velocity of the combustion products. That is a high velocity. As soon as the velocity of flight increases, the absolute velocity of outflow decreases, and the ratio of power gained and power lost becomes more favorable. At last a point would be reached where the combustion products would just be deposited in the wake of the airplane, with hardly any absolute velocity of their own, and hence with hardly any kinetic energy. The airplane then receives all the energy available. Long before that, the rocket engine becomes competitive with the cylinder engine, on account of its greater simplicity and because of the absence of all losses characteristic of conventional engines.

Increased speed, in spite of its increased horsepower requirement, does not call for increased storage facilities for fuel. This depends entirely on whether or not the drag (taken absolutely, in pounds) increases. The entire energy required for one trip is equal to the product of the drag and of the distance traveled, and therefore the amount of fuel is proportionate. Expressed in another way, the larger the speed, the smaller the time of traveling between two points, for which fuel is to be provided. The fuel to be stored remains therefore the same with equal drag.

*(Continued on following page)*





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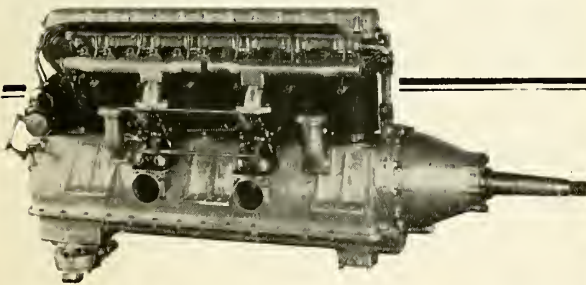
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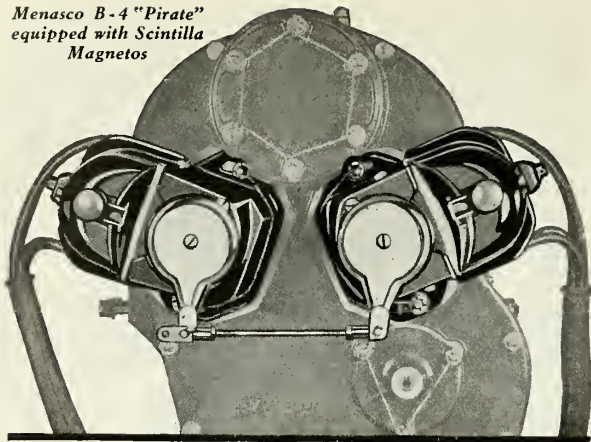


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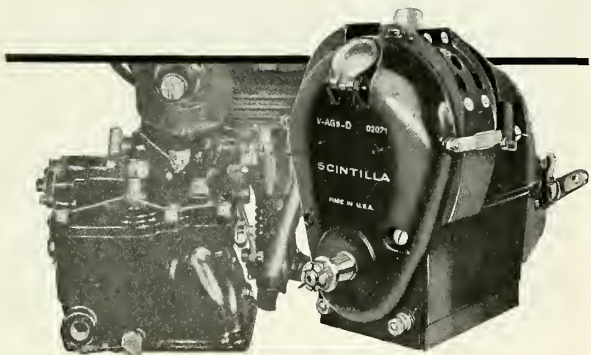


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*Menasco B-4 "Pirate"  
equipped with Scintilla  
Magnetos*



## MENASCO and SCINTILLA



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**SCINTILLA MAGNETO CO., INC.**  
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Contractors to the U. S. Army and Navy  
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**DEPENDABILITY  
SIMPLICITY  
ACCESSIBILITY**

(Continued from preceding page)

Dismissing from our minds just another moment the questions of starting and landing, we will at last clarify these evasive thoughts by some numerical value, even though it be ever so approximate. Such an estimate should be based on the technical art of today—not on future inventions. A parasite area of one square foot (that is, a fuselage with as much resistance as a disc having an area of about one square foot) is probably large enough to enclose a compact power plant of 600 horsepower and to house the occupants of the airplane. In slightly rarefied air, and supposing this drag to include all resistance, we can obtain an estimate of the speed from the relation:

$$\text{drag} \times \text{speed} = \text{speed} \times \frac{1}{2} \text{speed}^2 \times \text{density} \times \text{drag area} = 550 \text{ horsepower}$$

This gives a maximum speed estimate of 700 miles per hour, or with 90 per cent propeller efficiency, a little less, but still more than 600 miles per hour. This 600 miles per hour, of course, constitutes only a kind of upper limit. It brings out clearly how much is still to be gained and how far our present art is still from the limit. It brings out how much could be gained if we could only solve the question of starting and landing in a more practical way than we do now. No one knows how that will be done eventually. The first step towards progress, however, is to see the problem clearly, and this is the theme of this article. Let it arouse us to more inventive enthusiasm for abandoning the present-day method of retarding flight and of using almost all available energy for dragging through the air, during the whole duration of the flight, the apparatus required only for short periods of landing and starting.

Trends and developments in aviation that may be forerunners of improvements along the line suggested are already discernible. The collapsible and retractable landing gear is one such indication; it is being employed in commercial flying. However useful it is, however, it does not reach the core of the problem and does not help in dispensing with an excessive wing structure which must be dragged through the air.

Taking off with small wing area does not offer unsurmountable difficulties, because on the ground we can have at our disposal all the facilities we need. Airplanes are often started from catapults, and wider use could be made of this principle. There could be such an improved starting device at each flying field. A starting truck on rails may be sufficient, as future airplanes may have enough excess power for a short while to dispense with an auxiliary source of power furnished from the ground. If a catapult or starting truck is employed, of course, the airplane might not start again under its own power after an emergency landing. But such landings should become rare exceptions, and the more compact structure of the high-speed airplane would cause it to be more adaptable to ground transportation to the next flying field, making the temporary incapacity less serious.

During the start, comfort dictates an increase of velocity not exceeding 300 feet per second during one second. It would therefore be necessary to allow at least three seconds in which to attain a starting velocity of 900 feet per second. During such a start, the average velocity would be half of that, or 450 feet per second, and hence the length of the run, 1350 feet, not allowing for any margin. At that rate it requires a force of about 15 tons to impart

(Continued on page 73)

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# Experimental

## WALL "WIZARD" ENGINE

**R**IGHT from the final test bench of the Wall Engine Laboratories of 5900 North Fairfield Avenue, Chicago, we bring our readers a story of Mr. Wall's latest model gas engine. He calls it the "Wizard," and if our readers could only see it run, they, too, would agree that it deserves this name. It throttles beautifully to a point where it just "ticks" over and then as the throttle swings open, it bursts into a powerful roar.

The new model is of the two-cylinder, horizontal-opposed, four-cycle type. The valves are in the head, and it is entirely

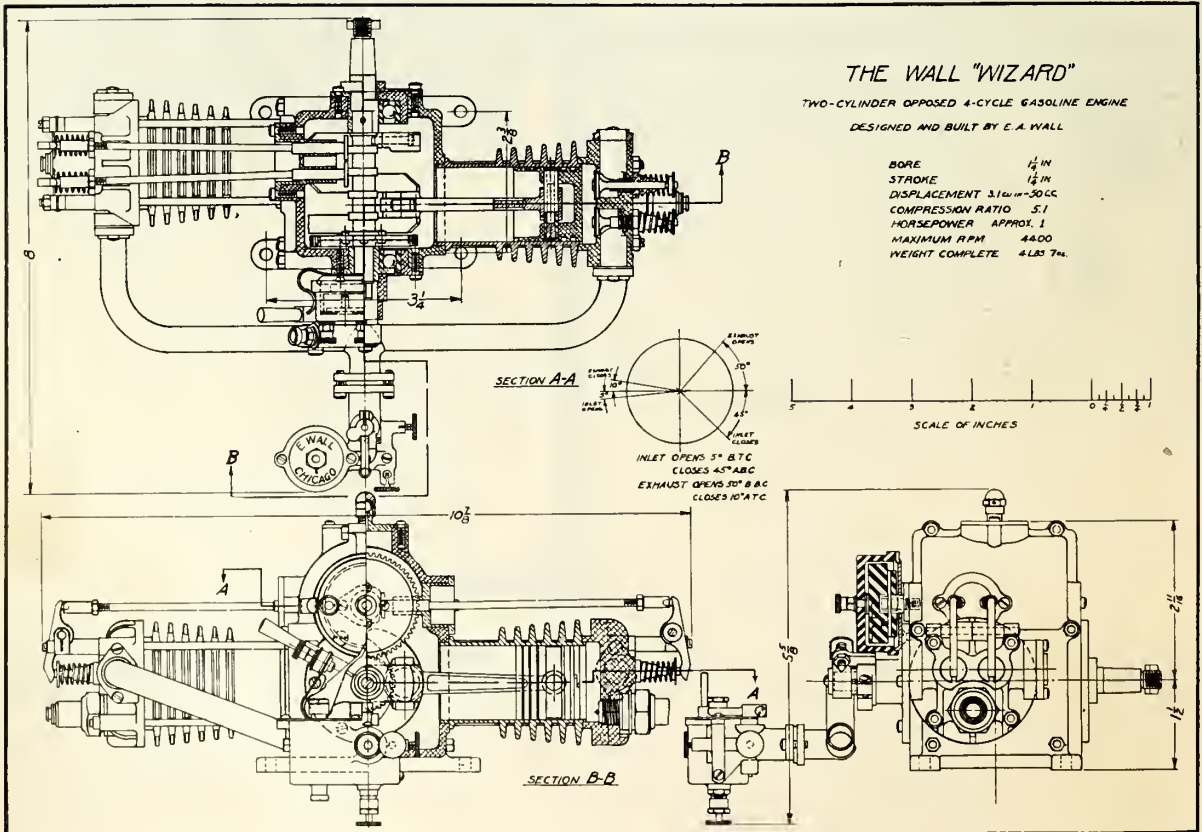
**R. E. DOWD**

cooled by air. The cylinder arrangement is staggered. Like the Wall Junior, described in the April issue of AERO DIGEST, the bore and stroke are  $1\frac{1}{4}$  inches. The horsepower, however, is more than doubled because of the higher speed and greater efficiency. It should have ample power to drive a large model of fifteen- to eighteen-foot wing span. In fact, about four of these little power plants concealed in the nose of a soaring glider wing should enable it to carry its pilot

and full flying load in level flight indefinitely. For such a purpose they might even be retracted not in use.

Space limitation unfortunately will not permit a detailed description of this remarkable engine, so we must limit our story to the outstanding features.

The combined gear and crank case is cast in two pieces of aluminum. The split is on the vertical center line. Precise alignment is secured by the front and rear bearing plates, which mount the ball bearings. Six  $\frac{1}{8}$ -diameter bolts serve to unite the halves. No gasket is necessary between the halves of the case.



The four mounting lugs are cast integral. A combination inspection plate and breather vent is located at the top of the case.

Electro cast steel is used for the double-throw crankshaft. Brass counterbalance weights insure smooth operation at any speed. The connecting rods are also cast. Bearing bronze is used throughout, and the crankshaft bearing end is split for attachment after machining.

The steel camshaft is machined in one piece. The lift of the cams is about 3/32. The gears are steel 3/16 face and 32 pitch and are attached to their respective shafts by machine screws. The steel tappets are mounted in a two-in-one bronze bearing, which is attached to the gear case by two machine screws. This bearing is lightened out effectively. Rotation of the tappets to prevent wear is accomplished by offsetting the cams 1/32 from center lines of the tappets.

Cast steel cylinders with 1/16 walls and integral fins are held in place by four 1/8 tie bolts, which are tapped into the case. Two of these bolts extend through the head to furnish a mounting for the rocker arm shaft.

The pistons are of a flat head design cast in Lynite. Two rings are used. The tubular steel wrist pins are provided with brass end plugs to prevent scoring the cylinder walls. The cast Lynite heads are fitted with straight valve guides. Mr. Wall has found straight valves a distinct advantage from both an efficiency and machining standpoint. A standard 12-millimeter Bosch plug is mounted parallel with the valve stems.

The steel rocker arms are bronze bushed and operate on a 1/8-diameter bearing. On account of their lever ratio the valves open a full 1/8. The push rods have an adjustment on the rocker arm end. The valves are turned from 3 1/2 per cent nickel steel. The overall head diameter of the valves is 1/2 inch while the stems are 1/8.

The intake manifold is formed of 7/16 outside diameter copper tubing. It is carefully bent so that the curves will convey the gas efficiently. Flanges and carburetor connection tube are soldered.

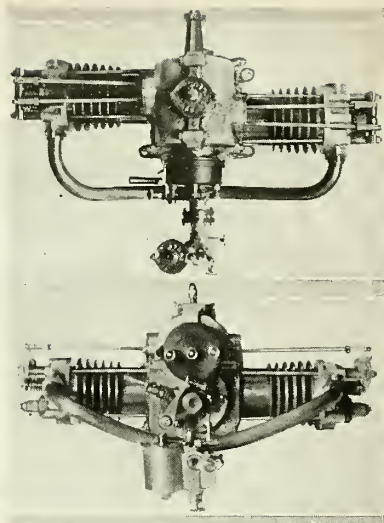
The carburetor is the horizontal type and is complete with float and three adjustments for idling, high speed and air blending. A butterfly valve operated by a small crank controls the amount of gas admitted to the manifold. A silver needle valve operated by the float assures perfect control of the gasoline flow. Being of cast aluminum, the weight of the complete carburetor unit is reduced to a minimum.

The circuit breaker is mounted on the crankshaft and is adjustable for spark advance and retard. This arrangement assures easier starting of the engine be-

cause of a quicker break and consequently a hotter spark. The distributor is located on the camshaft. The housing is bakelite, and the contacts, brass. The contacts are metal and are sufficiently long to cover the full range of spark adjustment.

Splash lubrication is used for all internal parts. The valve-operating mechanism is lubricated externally at proper periods. A drain plug on the case permits convenient draining of the oil, and the inspection plate at the top permits easy refilling or checking of the oil level.

Small power plants are usually difficult to start, but the Wizard, properly adjusted, never fails to "kick over" on one of the first few attempts. Those who have had the trying experience of "trying to start" small outboard engines will doubtless concede the name Wizard for this reason alone! Who's going to build the first flying model powered by the Wall Wizard?



The two-cylinder Wall "Wizard" engine

# PAPER AERODYNAMICS

## THE "EITHER-WAY" GLIDER

FOR the first time in aeronautical history, to our knowledge, we have a type of aircraft which will fly with perfect stability and equal facility in either direction. It does this automatically without requiring any adjustments of surfaces or ballast. As a matter of fact, it can readily change its direction of flight and "go into reverse" while gliding freely. And what's more, it can be dropped under certain conditions, to be described later, and it will actually choose its flight direction by itself.

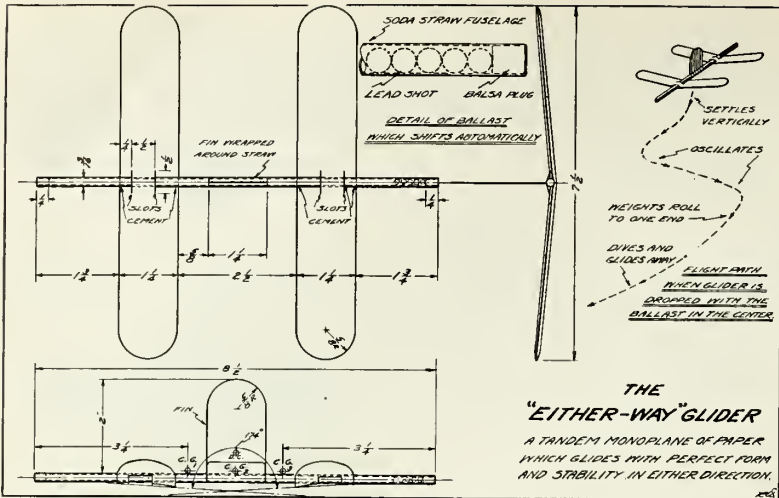
Here's a real mystery glider, one which will baffle the aerodynamic experts with its seemingly impossible performances. In fact, the more one knows about fundamental aerodynamics, the more puzzled he will be to see this miniature creation fly first "fore" then "aft."

A glance at the drawing will reveal the hidden secret. The fuselage of the glider is made from a regular soda straw, and the ballast is in the form of small lead shot, which are free to roll from end to end of the fuselage tube. But this is only part of the problem. We must not only have a movable center of gravity, which in its two extreme positions locates at the correct point for stability, but the whole airplane must be symmetrical. While single-wing designs

can be made symmetrical and stable for either direction, they have the undesirable trait of auto-rotating when the center of gravity is located momentarily at the center. The flight then changes into a "roly-poly" glide such as we discussed in the April issue.

This condition naturally leads us to consider the tandem form with decalage enough to provide ample stability and yet not so much that the rear surface loses its lift in normal flight. But still we have not satisfied all our requirements, for our fin surface must be so arranged that the center of lateral area or directional center, D.C. on the drawing, will lie sufficiently to the rear of the center of gravity to give our model good directional stability. Since we do not wish to move our fin surface, we have only one thing left to do and that is simply to have our C.G. move far enough fore and far enough aft to bring the distance between the C.G. and the D.C. up to the desired amount. In the present case this distance is .06 times the sum of the span and the length, which is just slightly greater than is customary in model design.

So these are our problems, and the little "Either-Way" glider as shown in our drawing is the result of working



them out carefully. It is simple to make and can be fully completed in about a half-hour by even the inexperienced builder, so why not get out some paper, a soda straw, cement, shot, balsa or even match sticks for end plugs, and get started? The best paper to use is heavy bond, such as ordinary letterhead stationery. Cardboard is much too heavy.

While the procedure is not particularly important, it will be found more convenient to start with the fuselage and fin. As indicated, the strip of paper for the fin wraps around the soda straw fuselage and is cemented back on itself. One end plug may be cemented in place, but the other should be inserted temporarily so that the ballast can be changed if necessary. Five lead shot about .010 in diameter will give the correct balance. Mercury might be used, but leakage and slow flowing would probably make liquid ballast less desirable.

After the fin and fuselage assembly is complete, the wings are slotted as indicated and slipped on the fuselage. Cement is used to fix them in position. The proper cambering of the wings will take some patience, but it will be facilitated by the slot arrangement. The dihedral angle will come quite naturally.

With all parts in place the C.G. location may be checked. It should be about as indicated— $3\frac{1}{4}$  inches from either end of the fuselage. Extra shot, or even lacquering the shot, will enable the builder to work this point out easily.

By far the most difficult trick in connection with this little model is the alignment, since ordinary wing drag, caused by a twist in the wings, may cancel out for flight in one direction but will cause a reverse effect in the opposite direction. Wash-in (greater incidence at the tip) for one direction becomes wash-out when reversed. The real check comes when

the model glides straight in both directions.

The drawing illustrates one stunt which is easily done, as follows: The shot are located at the center by shaking the model delicately back and forth. The straw will be found just transparent enough to show the shot in shadow form. The model is then dropped without forward speed. It will start to settle, then oscillate, finally going into a dive as the shot roll to one end. One end of the fuselage should be marked for identification.

Because of the tendency of the shot to roll easily, ordinary hand launching as used for paper gliders will not be successful. In fact, due to the inertia of the shot, which causes them to roll back, it will very likely reverse its direction and glide back toward the launcher. The simplest way is to release it nose down without appreciable push from an angle of about forty-five degrees. This works perfectly but is wasteful of height.

For a real forceful launch there seems to be only one successful method. This makes use of centrifugal force to hold the shot in the nose. The model is placed upside down in the palm of the hand, with the fin passing between the second and third fingers. The arm is then swung up from the back, and the model is released at the top of the arc. This gives a high, beautiful glide at an angle of about one in five to one in six. Outdoor glides will disclose some most remarkable antics, for at any instant the C.G. may go on a rampage and locate at any point of its two-inch range.

So here we have the "Either-Way" glider stripped of all its mystery, but if you want to have some real fun with the boys, don't tell them how it's done. Show them the stunts; let them guess which way it will glide from a dropped start, and when they gather around and begin popping questions, just say, "Houdini has a successor, boys. Don't believe your eyes. It's all done with mirrors!"

## READER CONTACTS

### Photo Exchange Club Shows Results

Fred (Fritz) Bamberger of 825 West End Avenue, New York City, writes that membership in the I.A.A.P.E.C. (International Amateur Photo Exchange Club) is growing rapidly. Members are now located in all parts of the country and even in far off Australia. To become a member one must have 100 negatives of different types of aircraft. A rating is given based on the collection of photos which applicants have.

Sounds like a good idea, Fred, and I am sure some of our readers will want to write you for further particulars. Much can be learned from photographs exchanged in this manner.

### Handy Tips From a Model Builder

A reader, G. E. Daniels, Jr., of 63 Valley Road, Larchmont, N. Y., sends in some good tips, which will be of interest to other readers.

Thanks, "G. E." We are printing a few which seem of most general interest:

"Difficulty is sometimes experienced in making a conical or cylindrical nose for a fuselage model whose body framework is square or rectangular in cross-section. Such a nose can easily be made of paper, rolled into a cone or cylinder and glued along the seam. Tissue paper should be pasted over the edges of the seam to prevent their rising. The grade of paper used in the nose should be determined by the weight and power of the model involved. The circumference of the cylinder should equal the perimeter of the foremost bulkhead of the fuselage framework and should have a reed ring at the front. The larger diameter of the cone should be large enough to fit over the foremost bulkhead of the fuselage; fitted tightly, it will blend smoothly into the lines of the fuselage.

(Continued on following page)

## FIVE YEARS AGO

(Continued from page 30)

planes. During the first 500 miles of the trip the *Bird of Paradise* encountered heavy cross-winds, but later on picked up a strong tail wind to help it on its way. In the course of their 25-hour flight they passed over only one steamer, which, however, confirmed the correctness of their navigation observations. Coming into Hawaii by "the back way," they missed the escort of planes which had gone out to greet them and so gave rise to rumors that they had not completed the flight. However, at 6:31 a. m., on June 29th, they landed at Wheeler Field, Honolulu, where a crowd had waited all night in a pouring rain for their arrival. The distance covered on this flight was 2,407 miles, the entire distance being over water.

Commander Richard Byrd and his crew (Bert Acosta, Bernt Balchen and George Noville) waited for weeks at Roosevelt Field to make sure of good weather conditions for their flight. During their time at the field, Lindbergh and Chamberlin had taken off and successfully completed their spectacular flights. Byrd, however, whose announced purpose was to demonstrate the feasibility of trans-Atlantic scheduled air service, waited until the reports seemed favorable. At 5:24 a. m. on June 29th, the *America*, a Fokker monoplane powered with three Wright Whirlwind engines, took off for Paris. Their radio equipment worked well, and all through that day and the following one, messages telling of weather conditions encountered were picked up in this country. As the *America* neared Europe, the messages were relayed from French stations. Contrary to the reports received before the start, storms were encountered as soon as the *America* was out of sight of land. Arriving over France in the midst of heavy clouds and rain, Byrd was unable to locate Le Bourget airport with sufficient accuracy to permit a landing and flew north to the Channel coast where finally, at 2:30 a. m., French time, July 1st, the gasoline being exhausted, a forced landing was made in the sea, near the shore, at the little town of Ver-sur-Mer.

## GENEVA'S WARNING TO AVIATION

(Continued from page 23)

on the other side of the Pacific has found them to be the mainstay of floating gun force.

Japan was immediately joined in her plea for the abolition of the aircraft carrier by France, which has had little experience with this type and less success with air power at sea. But England, which we are reminded has some little difficulty against submarine offensives in the last war, when canvassed concerning the Japanese proposal, countered with the suggestion that submarines be the weapon abolished.

So we become aware, or should, that the whole procedure of disarmament conferences is to give away, or work for the abolition of, that which you cannot use. Herein lies the warning for American aviation. Not all nations of the world have been as effective in the conquest of the air as has the United States. The day is coming when some power will propose the doing away with aviation.

The United States is definitely committed to a far-reaching policy in the air. Her interests in this new domain and the maintenance of the freedom of the air can be achieved only by air power. She has not been permitted

to protect this interest and heritage as she should, and each year that this program is delayed or retarded weakens her chances of properly defending the right of each nation to its own air policy when that question is finally brought out onto the trading block of an international peace conference.

The appointment this spring of an Air Commission at Geneva, and the making of the initial step of attempting to rate the air forces of the world indicate the approach of the day when nationals less fortunate in the air than we are will propose the complete banishment of the airplane in exchange, let us say, for an edict against infantrymen using skis, or vest-pocket size cruisers. Almost as ridiculous trades and "swaps" have already been proposed at Geneva.

Air power has removed a great portion of the natural, protective insularity of England, which she can only partially restore at the expense of maintaining great air fleets for Home Air Defense. Japan has already indicated her willingness, through an admission of inferiority, to abandon the airplane. The proposal has been made by another nation that all air activity be placed under an international agency. So you see we may not be as far from the day when it will be proposed that aviation be ruled out as we would like to think. For we see here the beginning of one of those "ganging up" movements by which disastrous coups are frequently achieved in international conferences.

There is an axiom that the best defense is an effective offensive. If the United States is to protect her right to an unrestricted development of aviation, it is not now too early to begin to prepare to clear the field of these subversive attacks upon aeronautics. Now that the aircraft carrier has been submitted as a legitimate target for the weakening of National Defense, it is time for Americans to register disapproval of the heavy limitation which has already been placed upon the aircraft carrier. We are more dependent upon aircraft carriers than any other nation in the world, and also our nation is more efficient in the use of this type of ship than any other nation. It is not too early to begin agitating for removal of limitation on aircraft carriers in 1936. It should be fully stressed and insisted upon at the next Limitation Conference that the United States should have twelve carriers instead of the present limitation of six.

But if the necessary and vital work of continued development of military aeronautics in the United States is allowed to go down hill as it has in the recent past, there will be no voice to protest, no power to challenge, and it would be an easy step to a world "paper" agreement to outlaw man from the air. The United States, which has nothing to gain from such a move, would, obviously, be the greatest loser.

In the past the only sure preventive of such ridiculous and short-sighted agreements has been the existence of one power which has a vital use and a well developed unit of the particular instrument which the other powers selfishly desire to see abolished. It is only by such a system of blocking that the future safety of nations is not completely bartered away at Geneva. In the case of aviation, it is not too early for the United States to begin to prepare to protect what she has a right to see in force until the last chemical bomb is destroyed, the last periscope has disappeared forever beneath the waves, the last gun is silenced, the last battleship is ruled off the sea.

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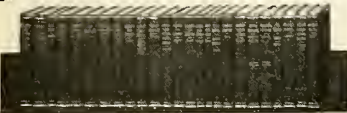
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FOR SALE: Brand new 45 h.p. Szekely Buhl Pup seaplane, complete with Robin pontoons, also undercarriage with airwheels. NC licensed as land or seaplane. A keen little outfit and priced to sell quick. Write or wire Becker-Fornier Flying Service, Inc., Jackson, Michigan.

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OX-5 TRAVEL AIR, relicensed; ship, motor, perfect condition; no time since overhaul; always hangared; never cracked up; looks like new. \$700. Archio MacDougall, Pembina, North Dakota.

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FAIRCHILD 71, a 7-place ship in excellent condition. Series "C" Wasp motor, major overhaul 75 hours hack. Full set of instruments, turn and bank, flares, landing lights, etc. Licensed, a bargain at \$3,600. Yellow Cab Airways, Des Moines, Iowa.

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ROBIN OX5. Millerized overhead, Scintilla magneto duals, 30/5 wheels, with NC license. Will consider trade on light open licensed job. G. K. Myers, Brackenridge, Penna.

FOR SALE: Waco J-5 Taperwing; tripped landing gear, speed ring, front cockpit cover; perfect condition; and an Irving set type chute, never used, all for \$2500. V. A. Rickard, Box 986, Schenectady, New York.

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STINSON 6-place, J-6-300 h.p., time 87 hours; like new; licensed; \$2750 cash. Will take Stinson Jr. with some cash, or two small open ships. James H. Bernard, Box 31, Youngstown, Ohio.

WACO TEN, new, 59 hours, NC691N, OX5 turns 1400; licensed to May 1933; always in hangar; \$550 cash. James H. Bernard, Box 31, Youngstown, Ohio.

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WACO TEN, completely reconditioned and recovered. Licensed May 17. Will sacrifice for \$800. Ch. Saracco, 327 West 27th Street, New York City.

FOR SALE: Factory rebuilt late type Kinner K-5 100 h.p. engine with front exhaust heads; not used since overhauled by factory; price \$540. An excellent buy. Charles Thompson, 614 Irving St., Alhambra, Calif.

OX-5 THREE-PLACE PHEASANT, identified, in good flying condition, \$190. Also OX-5 International, licensed, perfect shape, \$335. C. R. Muhlberger, Hamilton, Ohio.

FLEET KINNER K-5, new type heads, complete overhaul on motor and ship; new air wheels; complete communicating system; never been cracked. Write or wire, H. W. Rein, 7645 Forest View Drive, St. Louis, Mo.

CURTISS-WRIGHT JUNIOR: like new, \$700; Travel Air OX; good condition, \$600; Curtiss Robin OX, like new, \$700. Laurie Yonge, Municipal Airport, Jacksonville, Fla.

SWALLOW OXX-6 three-place biplane; good condition; licensed. Aerona, prefer two-place; will be accepted as part payment, or make me cash offer. John A. Williams, Smith Center, Kansas.

FOR QUICK SALE: Waco 90, OX-5, recently completely recovered and NC licensed. Will take car in trade. Becker-Fornier Flying Service, Inc., Jackson, Michigan.

BARGAIN SALE: Four-place Stinson Jr. monoplane with Whirlwind J-6-240 engine. New covering and upholstery. Engine just major overhauled and modernized; time 185 hours; price \$2000. Travel Air Speed Wing, Whirlwind 240 h.p. engine; total time 160 hours; perfect condition, price \$1750. Mid-South Airways, Crosstown Station, Memphis, Tenn.

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J-5 MOTOR: Used, semi-reconditioned; reground, new guides, husings, wiring, etc., with standard steel propeller, \$525. Full details on request. Royal Motors, 510 King, Peoria, Ill.

(Continued on page 94)

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**CURTISS JUNIOR** with new Szekely motor; total time on ship 60 hours; just licensed for 1933; perfect condition. \$800. Herman, 223 Durston Ave., Syracuse, N. Y.

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**WACO 9:** excellent condition, covered new last year; engine good; new Flctopp propeller; priced to sell. Laverne Whitlock, Davenport Center, New York.

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**BELLANCA CH J-5,** \$2500; Waco J-5, \$1700; Travel Air Gipsy, \$1400; Travel Air J-5, \$1800; Barling NB-3, LeBlond, \$850; NB-8 Trainer, \$1500. Heywood Starter, complete. Other bargains. Write for list. Northeastern Air Service, Inc., Bridgeport, Connecticut.

**CURTISS ROBIN,** attractively painted. Famous Tank Engine, 40 hours. Sacrifice for cash sale; instruction free! Plane just relicensed. Irving Kueblhorn, 7411 West Greenfield Ave., West Allis, Wisconsin.

**TRAVEL AIR B-4000;** J-5 biplane, built October 1929; just relicensed, excellent condition, never cracked; Frise type ailerons; new tires; brakes; air speed and compass; Hamilton-Standard prop; plane 330 hours; motor 510 hours; major overhaul on motor and plane at 312 hours; \$1600 cash. Will consider trade for Lambert or Warner Monocoupe. C. W. Bunch, Camdenton, Missouri.

**BELLANCA PACEMAKER JUNIOR** cabin monoplane, two-place, Warner motor, metal propeller, brakes, less than 100 hours. Cash price \$850. Will take late model automobile or training ship in trade. Arthur W. Killips, Lyons, Illinois.

**STINSON JR.,** J-6-7, 4-place; perfect shape. NC-474-H. Black fuselage, yellow wings. Cost new \$9500. A bargain at \$1500 cash or will trade for new DeSoto, Plymouth or Chevrolet Cabriolet at list price. J. M. Gentry, 922 Bass Building, Enid, Oklahoma.

**STINSON SM-1B Special.** \$1200 or trade. Airwheels, tail wheel, running lights, just overhauled, running sweet, looks great. Waco 10 wing, upper left, perfect, uncovered, \$50. Travel Air parts. Want cracked Waco cabin. Beebe Aircraft Service, Muskegon, Michigan.

**CURTISS-WRIGHT JUNIOR,** like new, \$775. Aeromarine Klemm, new Salmons motor, \$750. English Cirrus motor, run 20 hours, \$225. Dowden Engineering Company, Bristol, Pennsylvania.

**LICENSED AMERICAN EAGLE,** two years old. Excellent condition. New OX-5 motor, 30 hours. New Hamilton prop. Price \$375. Chester Franzen, Goodrich, North Dakota.

**FOR SALE:** Stinson Jr., powered with Wright 165, privately owned, splendid condition, \$1800. Very little time since overhaul. Charlie Fast, Route 2, Memphis, Tennessee.

**FOR SALE:** Bellanca Skyrocket, Wasp engine, cruises 130 m.p.h.; landing lights, semi-airwheels, sound-proof cabin; also Stinson Jr. with Wasp Jr. engine; cruises 120 m.p.h.; landing lights, airwheels. Florida Aircraft Corporation, Dunedin, Florida. ¼

**WACO MODEL C:** 150 hours; never damaged; privately owned; always hangared; steel prop; airwheels. Must sell; no fair offer refused. Write Waco, 1709 First National Bank, Baltimore, Md.

**FOR SALE:** Challenger KR-31 OX-5; cracked up, \$250 or will sell any parts on above. J. C. Finch, 322 Mill St., Danville, Pa.

**LICENSED VELIE CAVALIER:** 2-place cabin monoplane; like new; flown only 90 hours. Always in hangar; only \$750. Monty Barnes, 512 East Central, Wichita, Kansas.

**FOR SALE:** J-5 six-place Stinson, price \$1150; licensed. J. V. McClaffin, 21 Ramona Terrace, Pontiac, Michigan.

**FOR SALE CHEAP:** OX5 Waco 10, \$400; OX5 Robin, \$600; Eagle, \$590; OX5 motors, \$60. Will consider trades on anything. A. J. Hartman, Airport, Burlington, Iowa.

**FOR SALE:** Five-place Standard, like new, relicensed May 21st. Can be seen at Arcola Airport, Rochelle Park, New Jersey. Price \$4,000. 190 hours since major overhaul at Wright factory. Will consider three-place ship in trade as part payment. F. Mege, c/o Fred H. Trautwein, Arcola Airport R.F.D. 1, Hackensack, N. J.

## Miscellaneous Products & Equipment For Sale

**FOR SALE:** Heath motor in good condition, also Heath parts. Photo on request. H. C. Lenoir, 407 St. Charles Ave., Montgomery, Alabama.

**LATHES:** Used and reclaimed South Bend Lathes. One 9-inch, \$127; 13-inch, \$276; 16-inch, \$388; just a few left. Guaranteed good as new. Terms, or discount for cash. South Bend Lathe Works, 319 E. Madison, South Bend, Indiana.

**HENDERSON and HARLEY Propellers,** \$8. Ford Model A and T propellers, \$10. Henderson motor, fully aircraft converted, A-1 condition, \$90. Would like three-cylinder Anzani, Szekely or other. Edw. Schille, West Bend, Wisconsin.

**FOR SALE:** Tail group for Travel Air 2000, like new, unpainted. Waco 90, A-1 shape, licensed, hours. Motor just overhauled. C. Zarth, Jr., Worthington, Minnesota.

**NEW SHIPS,** \$495. New production motors, \$145. Propellers: Harley, \$4.50. Heath, metal tipped, \$8.98. Pietsenol, metal tipped, \$12.95. New Heath ship with new spare motor worth \$1,000, only \$398. Photo, all information, including leather bound flying manual, 25c stamps. Hibbs, Fort Worth, Texas.

**BARGAINS:** In motors, propellers, hubs for light-planes, windwagons and boats. Fords, \$50, Indians, \$35-\$45. Blueprints, motorcycles, cheap. Circulars, 10c. Storms Aviation Co., Spartanburg, S. C.

**THE NEW S B** light plane propellers give better performance. Let us quote on your propeller requirements. Address Dept. AD, Sensenich Brothers, Litzitz, Pennsylvania.

**FREE DOPE:** To put you wise to my low prices I'll send you free, one gallon of good Navy specification clear acetate airplane dope, such as I regularly sell for \$1.10 per gallon in five or 9cc per gallon in ten gallon quantities, if you'll send me 50c (cash, money order or check), to pay cost of can and boxing, one gallon only to a customer. Offer withdrawn after 500 gallons are given away. Shipped by express only. Karl Ort, 628 W. Poplar St., York, Pennsylvania.

**BARGAINS IN PROPELLERS:** Closing out our entire stock of brand new, late production, Hamilton wood propellers, Warner, Velie, LeBlond, Curtiss OXX, Whirlwind J-5, Curtiss Challenger, Anzani, Central Air Service, Battle Creek, Michigan.

**OX CHALLENGER:** Upper right, left, lower right wings, center section, uncovered; gas tank, radiator, tail group, covered; set streamline wires. Sell separately. No item over \$80 at Westport. OX Pitcairn, new covers, \$300 flyaway or trade for car; write Walter Rosenbush, Westport, Connecticut.

**HILL SPEED RING** for J-5, brand new, never uncrated, \$50. Spartan C-3 1929 and 1931 wings, parts, cheap. Commandaire fuselage. Diamond Airport, San Antonio, Texas.

**HAMILTON STEEL PROPELLER:** Fits anything up to 300 h.p. Like new; cost \$340. Sell for \$135. Also Wright J-6-7 parts, Scintilla magnets, Stromberg carburetors, etc., ½ list. AERO DIGEST, Box 1345.

**NEW HARTZELLS** for Warner, Siemens Halske, \$28; Moth wings, \$20; J-6 cylinder, \$15; Curtiss unlicensed amphibian, less motor, \$350; damaged Travel Air, \$95. Midway Aero Co., Box 233, St. Paul, Minn.

**LIGHT AIRPLANE AND GLIDER BUILDERS:** Here is something new. Use Duralumin in place of wood and steel in your ship. Build Duralumin fuselages, wing ribs, tail structures, landing gears, etc. New simple construction. Latest in aircraft. Passes requirements of Department of Commerce. For information and Duralumin prices, write Maliszewski Brothers Aircraft, 1606 E. Bellevue Place, Milwaukee, Wisconsin.

**SUMMER HELMETS,** fine white gabardine, \$1 each, postpaid. Green or olive drab pigmented nitrate dope, 5 gallons, \$3. New Pioneer compass, mounts flush with panel, \$22.50. New Lunkenheimer primer pumps, \$2. Complete tail group for Waco Ten. Dowden Engineering Company, Bristol, Pennsylvania.

**PROPELLERS,** popular make, brand new; closing out limited stock: Rover, \$15; Kinner, OX5, \$20; J-6, Hissco, \$25; others proportionately; J-5 metal, \$50; slightly damaged but repairable and serviceable Kinner, Warner, Challenger, \$10; OX5 Eagle, \$350; want Eagle wings, cowling. AERO DIGEST, Box 1350.

**MAGNETOS, ALTIMETERS, TACHOMETERS,** Turn Indicators, etc. Expert repairing and testing of any instruments. Repair estimates if desired. Government licensed mechanics. Streed Electric Co., 1312 Harmon Place, Minneapolis, Minnesota.

## Parachutes For Sale

**PARACHUTES:** Approved type. Seat, back, lap and chest, bought, sold, exchanged, repaired. Tell all first letter. Professional parachute jumpers and balloonist furnished for all occasions. Thompson Bros. Balloon & Parachute Co., Aurora, Illinois. Established 1903.

## Miscellaneous Services Opportunities, Offers, etc.

**FOR SALE:** Flying service and equipment; eight active students; live prospect list; good passenger carrying business. Equipment includes steel hangar accommodating five planes, four recently licensed airplanes with numerous extra parts, two parachutes of the latest type. Entire equipment guaranteed in first class condition. Located one and a half miles from the center of an industrial town, on state road, and surrounded by other industrial towns whose populations aggregate 200,000. Entire outfit and lease on field may be had for \$10,500 cash. Please do not answer unless you mean business and are prepared to pay cash. AERO DIGEST, Box 1335.

**CORBEN SPORTPLANES:** Are now available in single and two-place, open or closed designs, in semi-built kits or flyaway. Send dime for literature. Corben Sport Plane Company, Madison, Wisconsin.

**WANTED:** Expert Glider Pilot, familiar with shock cord launching method. Wholly commission basis. I furnish best of equipment and field on main highway. Living expenses reasonable. Robert W. Lowell, R. D. 2, Carmel, Maine.

**OPPORTUNITY:** Parachute toy; sells fast at airports and air meets. Sample, 15c; two dozen \$1.50. Box 212, Saratoga Spa, New York.

**BARGAINS:** Hamilton wood propellers: Whirlwind J-5, Curtiss Challenger, \$45; Warner, LeBlond, Velie, English and American Mark III Cirrus, \$35; Curtiss OXX, \$30; Anzani, \$25. Central Air Service, Inc., Battle Creek, Michigan.

**WANTED TO LEASE** an airport near a good sized town. Must have hangar. Give full particulars in first letter. Write AERO DIGEST, Box 1343.

# CLASSIFIED ADVERTISEMENTS

10¢ per word; \$2.50 minimum. Payable in advance.

## Wanted To Buy Or Trade

WANTED: Monocoupe Lambert, Warner or Kinner. Good condition; licensed. Give price. Bryan Svec, McFarland, Calif.

WANTED: A good plane to put to work. Fine territory, experienced pilot. Open or cabin. Light. Returns guaranteed. No. OX. Baker Flying Service, Petersburg, West Va.

HAVE CLEAR real estate in Akron and Cleveland to trade for late model, licensed plane. Give full particulars and price. AERO DIGEST, Box 1339.

WILL PAY CASH for good used Menasco. Wright Gypsy, or Cirrus, with propeller. Must be excellent condition; no junk. James Talley, Elk Point, South Dakota.

USED STINSON TRIMOTOR wanted for cash. Ship must be in first class condition and priced low. Reply with full details to Baltic Shipping Co., Inc., 8 Bridge Street, New York City.

WILL TRADE half section improved wheat, corn, cotton, feed land, 300 acres in cultivation, for 4-place cabin. Good crops now growing. All letters answered. Lubbock Flying Service, Inc., Crosbyton, Texas.

SPOT CASH paid for Wacos, Travel Airs, Birds, Monocoupes, or what have you. Give full particulars in first letter. 1406 Union & Peoples National Bank Building, Jackson, Michigan.

WHAT HAVE YOU to offer for corner plot 60 x 100 or lot 20 x 100 or for both parcels, to be hiked from subway? R. J. Lewis, 1516 Flatbush Avenue, Brooklyn, N. Y.

WANTED: Air-cooled 3-place biplane or .....? Trade my established lunchroom and rooming business, complete fixtures, \$20-\$30 day; free rent. R. R. Smith, 624 Central Ave., Minneapolis, Minn.

WANTED: Lower crankcase for American Cirrus Mark III, 90 h.p. upright motor. Roy V. Wright, 511 East 10th Street, Pittsburg, Kansas.

TRADE late 1929 Hudson sedan, equipped with Philco Transitone radio. Want any licensed airplane. M. Gunther, 40 Park Street, West Haven, Connecticut.

WANTED: Best buy in slightly used Irvin silk seat and back pack. Consider sponge back pack, if reasonable, or two sets if reasonable, for cash. Russell Ahrens, Fort Jervis Airport, Fort Jervis, New York.

WANTED: Open ship, one or three-place; 300 horsepower or over. Desire instruments and night flying equipment on same. AERO DIGEST, Box 1341.

WANTED: OX-5 Waco, Travel Air, Challenger, or Robin, needing re-covering or work. License unnecessary, but must be eligible. Cheap for cash. William A. Houser, Route 10, Madisonville, Ohio.

WANTED: Will pay \$100 cash for used Aerona E-107-A motor in good condition. For sale, cheap, parts for Anzani 45. David Eaton, 125 Carmel St., Kalamazoo, Mich.

WANTED: Great Lakes Model 2T1A, upright motor, airwheels; will pay cash if priced right; must be in good condition. What have you? Manager, Wyoming Valley Airport, Wilkes-Barre, Penna.

WANTED: Collegian Aerona in perfect condition; have cash waiting; lowest possible price. Act quickly. Send details. Stephen Reich, 106-12 Pine Grove St., Jamaica, N. Y.

WANTED: Lower wings and engine cowl for Waco Nine; right front drift strut for Velie Monocoupe. For sale: Heath in good flying condition, also control surfaces for Eaglerock and Waco Ten. Fast Aero Service, Memphis, Tenn.

WANTED: Good used wings for center section Eaglerock, lowers, also amphibion, 3 or 4 place, to buy for cash or lease. Becker Flying Service, Buffalo, N. Y.

WILL PAY CASH if priced right, for licensed Monocoupe, Bird, Waco, Great Lakes, Eaglet, Rearwin Jr., or Aerona. City Airport, Youngstown, Ohio.

WANTED: To trade new 1931 model automobile for licensed airplane. What have you? AERO DIGEST, Box 1347.

WANTED: Fairchild 71 in good condition, preferably less motor; or will sell Wasp B motor, 330 total hours; completely overhauled. Leavens Bros., Belleville, Ontario, Canada.

WANT MONOCOUE without motor, or I will sell my practically new Velie M5 motor. Harold M. Lake, Gettysburg, South Dakota.

WANTED: Licensed OX Robin and pair wings, stabilizer, flipper, shock struts, wing struts and wing ribs for Robin. Must be sacrifice for cash. Monty Barnes, 512 East Central, Wichita, Kansas.

WANTED TO EXCHANGE: Moving picture equipment; 240 theater seats; two Powers 6B moving picture machines; 2 Mazda lamp houses; Movie Phone talking equipment; for Waco Model F, licensed, no crack-ups. Dr. A. H. Frye, Griffin, Georgia.

I'M LOOKING FOR a licensed ship in first class condition. Preferably a Kinner 125 Bird, with starter. Name lowest cash price and give details of ship. AERO DIGEST, Box 1351.

## Positions Wanted

DRAFTSMAN: Mechanical draftsman, age 21, two years experience, wants position in drafting room, preferably connected with aviation. Will work hard for low steady salary. Best references. AERO DIGEST, Box 1334.

LICENSED MECHANIC, A & E, 6 years experience; formerly with American Airways, and U. S. Marine Corps. Speaks Portuguese, little Spanish. Wishes position of mechanic or what have you? Write E. J. L., 411 Springfield Ave., Newark, N. J.

LIMITED COMMERCIAL PILOT, age 20; holds radio telephone operator's license. Graduate of government approved flying school. Will go anywhere; best of references. Arthur Johnson, 111 Indian Neck Ave., Branford, Conn.

DRAFTSMAN: Well trained, but without practical experience, wishes connection with the aircraft industry. One year college, age 19. Salary secondary. References. Thomas Beckwith, Hawthatha, Kansas.

LICENSED AIRPLANE MECHANIC: Age 22, single. Three years army experience. Technical high school and A. C. T. S. graduate. Ready for engine license. Future essential; salary no object. Go anywhere, U. S. or abroad. Ronald G. Bell, 4607 No. Kedvale Avenue, Chicago, Illinois.

TRANSPORT PILOT, 900 hours, day and night; radio phone experience. Age 35. Go anywhere. AERO DIGEST, Box 1337.

YOUNG MAN, age 23, single, aviation technician, desires employment. Living expenses and flying time, go any place, do anything; good references. Charley K. Bergstrom, R. R. 2, Cuba, Kansas.

TRANSPORT PILOT, 4100 hours, largely seaplane and amphibion. Experienced instructor and test pilot, with engineering training. Clifford L. Webster, 119 Murray Avenue, Port Washington, N. Y.

MECHANIC, many years' experience in the overhauling of airplanes and engines; general maintenance, etc., wishes steady position. AERO DIGEST, Box 1346.

TRANSPORT PILOT: Wide experience, best references; investigate. Have good proposition for reliable private plane owner; will teach to fly free. Must be located near New York. AERO DIGEST, Box 1342.

ENGINEER, 8 years experience with leading companies. Familiar complete stress analysis. Design. Transport rating with test pilot experience. Will go anywhere. Can handle complete design, analysis, construction or reconstruction of aircraft, or consultation. AERO DIGEST, Box 1349.

TRANSPORT PILOT: Over 500 hours with Great Lakes; open for any proposition, in any part of country. Student, cross country and night flying experience. AERO DIGEST, Box 1348.

TRANSPORT PILOT; experienced cross country, student instruction and night flying; ratings on open and cabin ships; single, age 21. Fremont C. Rohrer, Cochrane, Wisconsin.

(Continued on page 96)

★  
**SUCH  
RESULTS  
ARE NOT  
AT ALL  
RARE**  
★

LAST month AERO DIGEST published a \$2.50 classified advertisement for a flying club who wished to dispose of a used light plane—a Taylor Cub, to be exact. ¶ More than pleased with the results, they tell us that their advertisement pulled over 70 replies. At this rate, their inquiries cost only about 3½ cents apiece. ¶ Such results are not at all rare among AERO DIGEST classified advertisers, for we have been publishing similar statements in these columns, in every issue. The rate for this advertising is only 10¢ a word, with a minimum charge of \$2.50. Forms for July classified advertising close June 23rd.

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## CLASSIFIED ADVERTISEMENTS

10¢ per word; \$2.50 minimum. Payable in advance.

### Patents and Inventions

**INVENTOR'S UNIVERSAL EDUCATOR.** Contains 100 mechanical movements; 50 perpetual motions; instruction on procuring and selling patents and selecting an attorney, etc. Suggests new ideas. Price \$1.00 postpaid in U. S. A. Address Dietrich Co., 602-C, Ouray Building, Washington, D. C.

**PATENT YOUR INVENTION:** Send for Free book, "How to Obtain a Patent," and "Record of Invention" blank. Consult us about how to protect your ideas. Victor J. Evans & Co., 634-C Victor Building, Washington, D. C.

**FREE BOOKLET** and personal answers on patenting inventions. Sterling Buck, 25 years registered patent attorney. A829 F, Washington, D. C.

### Model Aircraft and Gliders

**ALEXANDER GLIDER FOR SALE:** Metal tube construction, wheel landing gear, good condition; now in use, price \$130. Circus City Flying Corp., Peru, Indiana.

**ONE CYLINDER GAS** and 4-6 cylinder air motors; 1 to 6 foot scale flying models. Catalog dime. Miniature Aircraft Corp., 83 Low Terrace, New Brighton, N. Y.

**MODEL AIRPLANE MATERIAL:** Five large sheets Japanese tissue 20 x 24; bundle various sizes balsa, rubber band and price list. All for 25¢; five kits for \$1.00. Aero Shop, 3050 Hurlbut Ave., Detroit, Mich.

**BEAUTIFUL 20" true scale** ornamental models of the new Curtiss Hawk P6E and Falcon AC3, at unusually low introductory prices. Striking art piece for the radio or mantel. Photographs 10¢ each. Victor Stanzel, Schulenburg, Texas.

There are more than 140 classified advertisements in this issue of AERO DIGEST—more than in any other aviation magazine. For results, use the DIGEST first.



# Research

PERHAPS no one phase of aeronautics requires as much time, thought and expense as does the problem of **maintenance**.

The entire resources and laboratories of one of America's oldest research organizations have been devoted to the perfection of a standardized system of **maintenance** for airport buildings and hangars.

The experience gained through this research is available to airport and airline executives.

THE

# HANGAIRLITE

PROCESS

HAVE YOU **SMOGS**  
IN YOUR HANGAR?

These costly little chaps can be entirely eliminated from your hangars and ships. "SMOGS", tiny particles of smoke and fog that gather on everything around a hangar, disappear when HANGAIRLITE is introduced.

HANGAIRLITE is a complete system of hangar maintenance. Every step in the complete care of air equipment has been carefully and thoroughly studied and tested. The HANGAIRLITE man has something new to show you—watch for him.

AIR INDUSTRIES RESEARCH

DUBUQUE, IOWA

# IN THE FROZEN NORTH



## ALASKAN AIRWAYS and

# ECLIPSE



Alaskan Airways, Inc., a division of American Airways, Inc., is the leading company operating within the Alaskan territory and extending into the Canadian Yukon and eastern Siberia.

This company last year, alone, carried over 1500 passengers to and from the frozen North.

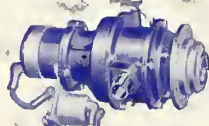
Every start of every flight of this great system is an Eclipse job; and a tough job — operations are at temperatures from 20 degrees above to 50 degrees below zero.

Starting facilities *must* be dependable. They are... Eclipse makes sure of that.

In the frozen North or torrid tropics, in any weather; over land or sea, Eclipse Products perform as always — dependable.

**ECLIPSE AVIATION CORPORATION, East Orange, N. J.**

*(Subsidiary of Bendix Aviation Corporation)*



Eclipse Series 6, Combination Hand and Electric Inertia Starter with Solenoid Switch. Concentric type for radial engines up to 1350 cu. in. piston displacement. Also obtainable without electrical attachment, for manual operation.



Eclipse Voltage-Regulated Generator. 15 volt, 15 ampere capacity, engine drive type with control box.

